

**Examining medical doctors' internship training
experience and labour market transition in Kenya**



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Abstract

Kenya has a severe shortage of doctors. Despite medical schools increasing the numbers of medical officers (MO) in training, less than half of newly qualified/registered MOs were absorbed by the public sector between 2015 and 2018. It seems timely to understand the labour market for this profession in system terms and in personal terms for doctors, especially during their labour market entry. I used a multiple-method approach including literature reviews, quantitative survey and qualitative interviews to examine doctors' internship training experiences and labour market transition in Kenya.

I found that the resources available in hospitals overall was often inadequate to support medical internship training in Kenya, especially for Level 4/district or smaller hospitals. Over half reported that their hospitals did not have enough consultants, physical resources and supplies of diagnostics, equipment and medications required for their study and work. Over half of the interns experienced burnout and anxiety, some did not have good supervision at all times and had to perform inappropriate tasks, especially in smaller hospitals. Such poor internship experiences influenced MOs' career intentions. Some preferred to leave the public sector, however the majority still preferred to work in the public sector or continue with specialist training immediately after internship. Nonetheless, as decentralisation in 2013 led to county governments being responsible for local workforce recruitment, they are not absorbing these MOs into the public sector. This is for reasons including limited health system financing, a willingness to rely on interns to provide hospital care, and preference for recruiting other cheaper health worker cadres. These findings suggest that Kenya needs to take a strategic approach to

match the demand and supply of physicians, especially at labour market entry (i.e. internship) as well as improve the internship training resources and capacity. Poor planning and management not only wastes resources and undermines healthcare delivery, but can also be detrimental to individual physicians.

Declaration and publications

This thesis is entirely my own work except where otherwise indicated. The following peer-reviewed papers that I first-authored or first-co-authored contain contents from this thesis:

- Zhao Y, Osano B, Were F, Kiarie H, Nicodemo C, Gathara D, English M.
Characterising Kenyan hospitals' suitability for medical officer internship training: a secondary data analysis of a cross-sectional study. *BMJ open*. 2022 May 1;12(5):e056426.
- Zhao Y, Musitia P, Boga M, Gathara D, Nicodemo C, English M. Tools for measuring medical internship experience: a scoping review. *Human resources for health*. 2021 Dec;19(1):1-2.
- Zhao Y (co-first author), Mbuthia D, Gathara D, Nzinga J, Tweheyo R, English M.
'We were treated like we are nobody': a mixed-methods study of medical doctors' internship experiences in Kenya and Uganda. *BMJ Global Health*. 2023 Nov 1;8(11):e013398.
- Zhao Y, Jalloh S, Lam PK, Kwarshak YK, Mbuthia D, Misago N, Namedre M, Phương NT, Qaloewa S, Summers R, Tang K. Development and validation of a new measurement instrument to assess internship experience of medical doctors in low-income and middle-income countries. *BMJ Global Health*. 2023 Nov 1;8(11):e013399.

- Zhao Y (co-first author), Mbuthia D, Blacklock C, Gathara D, Nicodemo C, Molyneux S, English M. How do foundation year and internship experience shape doctors' career intentions and decisions? A meta-ethnography. *Medical Teacher*. 2023 Jan 2;45(1):97-110.
- Zhao Y (co-first author), Mbuthia D, Ankomisanyi DS, Blacklock C, Gathara D, Molyneux S, Nicodemo C, Okello TR, Rutebemberwa E, Tweheyo R, English M. The influence of internship training experience on Kenyan and Ugandan doctors' career intentions and decisions: a qualitative study. *Global Health Action*. 2023 Dec 31;16(1):2272390.
- Zhao Y, Mbuthia D, Munywoki J, Gathara D, Nicodemo C, Nzinga J, English M. Examining the absorption of post-internship medical officers into the public sector at county-level in devolved Kenya: a qualitative case study. *BMC Health Services Research*. 2023 Aug 19;23(1):875.

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List of Abbreviations

ACGME	Accreditation Council for Graduate Medical Education
CASP	Critical Appraisal Skills Programme
CBA	Collective bargaining agreement
CEC	County Executive Committee
CFI	Comparative fit index
CME	Continuing medical education
CO	Clinical officer
CT	Computerised tomography
DHIS2	District Health Information Software-2
ECG	Electrocardiogram
ENT	Ear, Nose and Throat
FY	Foundation year
GDP	Gross Domestic Product
GHQ	General Health Questionnaire
GMC	UK General Medical Council
GP	General practitioner
HADS	Hospital Anxiety and Depression Scale
HRH	Human resources for health
I-CVI	Item-level content validity index
iHRIS	Integrated Human Resources Information System
IHME	Institute for Health Metrics and Evaluation

IMF	International Monetary Fund
IPC	Infection prevention and control
KEMRI	Kenya Medical Research Institute
KHFA	Kenya Harmonised Health Facility Assessment
KMO	Kaiser-Meyer-Olkin
KMPDC	Kenya Medical Practitioners and Dentists Council
KMPDU	Kenya Medical Practitioners and Dentists Union
KWTRP	KEMRI-Wellcome Trust Research Programme
LMICs	Low- and middle-income countries
MBChB	Bachelor of Medicine & Bachelor of Surgery
MBI	Maslach Burnout Inventory
MFL	Master Facility List
MIES	Medical internship experience scale
MO	Medical officer
MOH	Ministry of Health
NHIF	National Hospital Insurance Fund
OBGYN	Obstetrics and gynaecology
PCR	polymerase chain reaction
PHEEM	Postgraduate Hospital Educational Environmental Measure
PHQ-9	Patient Health Questionnaire-9
PNP	Permanent and pensionable
ProQOL	Professional Quality of Life Scale
PSS	Perceived Stress Scale

REDCap	Research Electronic Data Capture
RMSEA	Root mean square error of approximation
S-CVI	Scale-level content validity index
SARA	Service Availability and Readiness Assessment
SAQ	Safety Attitude Questionnaire
SDGs	Sustainable Development Goals
SPA	Service Provision Assessment
SRMR	Standard root mean square residual
UHC	Universal health coverage
WHO	World Health Organizations
WISN	Workload Indicators of Staffing Need

Chapter 1. Introduction

In this chapter, I provide an overview of major concepts and topics related to the health labour market, internship training experience of doctors, as well as Kenya's context and background which is the country of focus for my thesis. I conclude this chapter with a summary of the thesis's aim and structure.

1.1. Human resources for health and the labour market

Human resources for health

Health systems can only function with health workers (1). Human resources for health (HRH) include a large range of occupations that work to promote or improve health, and both the United Nations Sustainable Development Goals (SDGs) and the World Health Organization's (WHO) Strategy on Human Resources for Health "Workforce 2030" emphasised the importance of substantially increasing the recruitment, development, training and retention of HRH to accelerate progress towards universal health coverage (UHC) and other key agenda (1–3).

WHO and the World Bank Global Strategy on HRH projected that globally there were 43.5 million health workers in 2013 and that an additional 18 million health workers are needed by 2030, using a needs-based "SDG" index model (1). While estimates by the Institute for Health Metrics and Evaluation (IHME), using a different target and data modelling approach, suggested that in 2019 globally there were 104.0 million health workers including 12.8 million physicians, 29.8 million nurses and midwives (3). They estimated an additional 6.4 million physicians and 30.6 million nurses and midwives

would be required for all countries to achieve an 80% “score” on the UHC effective coverage index (3). Both estimates highlighted the significant lack of HRH availability, especially in low- and middle-income countries (LMICs) and most particularly sub-Saharan Africa: 6.1 million health workers including 1.1 million doctors and 2.8 million nurses and midwives according to WHO and 1.9 million physicians, 5.6 million nurses and midwives according to IHME (1,3). Closing such gaps will incur major costs. HRH spending represents the single largest proportion of service delivery in LMICs, and countries often spend over half of their recurrent health budget on HRH, which limits the ability to increase the availability of HRH (4).

Additionally, mere quantity of HRH is not enough – improving health service effective coverage also requires the accessibility, acceptability, quality and appropriate skill-mix of the workforce which also includes health workers’ morale and motivation (1). Health workers can only function with broader health systems support and inputs such as the adequate supply of medicine and supplies, functioning equipment and effective supervision and management (1,4).

Health labour market

A labour market is “the place where labour services are voluntarily bought and sold” (5). Figure 1 provides an overview of the major dimensions or building blocks in a health labour market developed by Soucat et al. (5). The two most important forces are supply and demand: labour market supply refers to the number of doctors, nurses, midwives and other cadres, that are available and willing to work. The number of health workers available is driven mostly by the training and education sector, including the number of

new entrants into, and graduates out of, training programs, and the costs and financial burden of pursuing the training (5,6). The labour market demand refers to the number of the above-mentioned health worker cadres that employers are willing, and able, to pay for. These employers include public, private and faith-based institutions as well as, sometimes, donors and self-employment (6,7). The combination of needs, demand, supply, governance of labour market and policy as well as health workers' own incentives and motivations determine the wages, benefits and allowances in the market, the number of health workers employed, the number of hours they work and the geographic locations in which they work. Subsequently, these influence health workers' performance productivity and eventually health system outcomes (6). For example, different employers would compete for health workers based on wages and benefits as well as working conditions. The higher the wages and the better the working conditions, the larger number of available workers would want to work for the specific employer, while more will also consider being trained as a health worker so that the future supply of the workforce would increase (7).

In this thesis, I primarily focus on specific components of the health labour market framework, i.e. training and education, supply and demand, as well as the employment outcomes (wages and employment), which will be explained in Section 2.1.

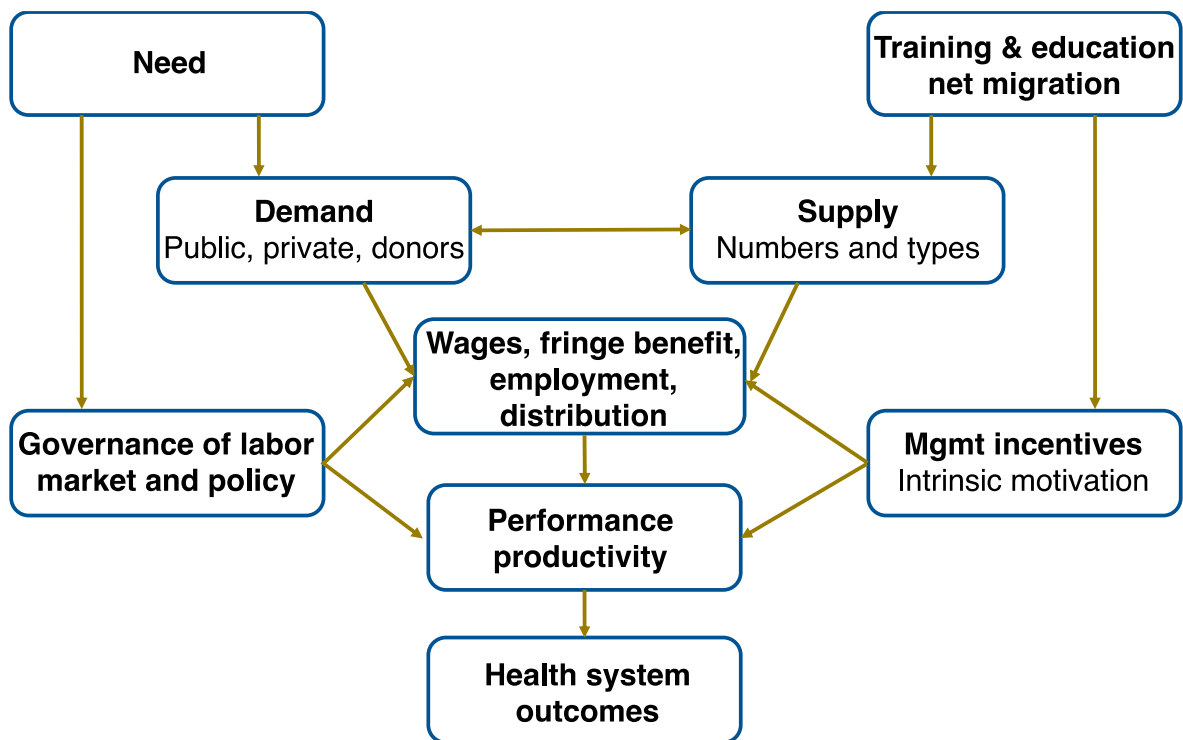


Figure 1. Health labour market framework developed by Soucat et al.

Source: (5)

Challenges with the health labour market

The health labour market faces challenges. These range from production challenges where countries may not have adequate training and education capacity, distribution challenges where for example health workers are concentrated in cities rather than in rural areas, performance challenges such as low service quality and absenteeism, and also underutilisation and financing challenges (5). I primarily focus on underutilisation as this is one of the prominent challenges for the medical workforce in Kenya, and I will also introduce the financing challenge in order to explore the consequences of current financing for underutilisation in Kenya.

Underutilisation refers to the oversupply of persons trained as health workers when compared to the number of health workers employed, which is a common labour market mismatch. Mismatches can be due to premature mortality of health workers due to diseases, conflict or injury, health workers' migration to another country and also in many cases absorption challenges and unemployment (5). In Tanzania, only 45% of post-internship doctors were recruited by the public sector in 2010 , and correspondingly, the private sector is not well-established and thus can only absorb a small number of doctors, leading to many of these graduates not practising medicine anymore (8,9). In Chhattisgarh state of India, health labour market analysis also suggested that rather than not producing enough health workers, poor absorption by the public sector is the key challenge (10). One common reason for underutilisation is that production of health workers is usually the responsibility of the Ministry of Education, colleges and universities, and the health sector sometimes is unable to effectively influence training curricula, student intakes and outputs (8).

Addressing the HRH gap requires huge financial resources, and countries face resource constraints and challenging trade-offs across and within sectors when trying to meet the basic needs of the population (4). Scaling up HRH would require resources for producing them (training and education) and costs for hiring (wages and benefits). While in some countries production costs are diverted to the education and private sector, employment costs contribute to a significant amount of government spending. Governments are often limited by their tax taken from gross national income, willingness to borrow, and sometimes insurance and other financial risk pooling mechanisms for general health financing, which would be used to pay for HRH. Governments are also reluctant to

borrow to expand fiscal space for recurrent costs, often for economic reasons like macroeconomic stability, which limits their financial capacity for additional hiring (4,11). While donor support for HRH has increased over the past decade, only 4.1% of the spending flow is to staffing because of sustainability concerns and financing HRH salaries is often thought of as the responsibility of government (12). Additionally, structural adjustment and austerity measures related to International Monetary Fund (IMF) programs often require countries to control the size of their public sector wage bill, which greatly impacts public sector employment (6,11,13).

Specific challenges with the medical workforce

Compared to other health worker cadres, planning of the medical workforce is more challenging due to several reasons. Production of doctors is costly and lengthy, as the training of doctors commonly requires undergraduate training of five to six years, and additional internship training. Specialty training can add up to another ten years. The production also requires advanced training and education capacity of universities and hospitals. The medical workforce is also more likely to encounter distribution challenges. In LMICs, doctors are more likely to stay in well-served urban areas, migrate to other countries or enter non-clinical professions such as research or non-governmental organisations (9). Over long training cycles countries' economic situation may change dramatically, in a period of economic downturn there might be huge numbers of doctors-in-training that cannot be absorbed after they graduate, leading to underutilisation (14). Lastly, training and (sometimes) salary costs of doctors are much higher than other healthcare cadres (15), and countries need the financial resources to support their training and subsequent employment. Additionally, medical workforce planning also

requires carefully balancing between generalist doctors and specialists to better match population needs, as part of larger health workforce planning considering the overall skill-mix (16).

Given the particular challenges with the medical workforce it is this group that I focus on in this thesis. Due to data limitation, I only focus on physicians and exclude dentists and pharmacists that are sometimes considered together with medical doctors.

1.2. Medical internship training

Medical internship and experience

In most countries, all doctors must complete a medical internship after completing four to six years of medical education, and before becoming generally licensed and registered with the medical board of that country. Internship is a structured period where doctors in training transit from supervised learning in medical schools to rapidly assuming clinical responsibility under supervision, with the aim of helping new graduates to consolidate and apply their clinical knowledge and skills in real life, and learning how to provide safe and effective care (17–19). The programme of internship could be different in each country and setting: in the UK, Modernising Medical Careers was introduced in 2005 and restructured the one-year pre-registration house officer and the first year of the senior house officer training into a two-year Foundation Programme (20); in Kenya and many African countries, internship is a one-year stand-alone programme of post basic training leading to licensure (21); while for countries like the US, internship usually refers to the first year of residency where qualified doctors undertake graduate medical education to obtain a license for a chosen specialty (22).

Despite the different terminology in each setting, interns are all under huge pressure: highly demanding working hours, less satisfactory pay and a need for ongoing learning and assessment (22). Interns also need to shift their identity to that of physicians and take on new responsibilities and challenges. Some may begin to lack confidence in their ability to manage uncertainty when responsible for others' lives, especially when facing sudden patient deaths (23–26). Such factors can result in rapid burnout and stress and other mental health problems (23,27,28).

Depending on the context and more commonly for LMICs, interns may also experience low availability of resources, limited supervision and feedback (29), poor safety climate, extremely poor working conditions and employment conditions such as working without pay for a long time (30). Erasmus et al. described interns in South Africa as “slaves of the state” (31).

The internship experiences of doctors are important not only to ensure the psychological health and wellbeing of doctors in training, but also because their experiences during internship impact doctors' future career choices. Poor experiences may push doctors to avoid certain specialties or organisations and in some cases leave the profession as soon as they are licensed/registered (32). We must also remember that today's interns will become tomorrow's doctors and specialists who are often then responsible for the training of the next cohorts of interns and other health worker cadres (33), therefore poor internship experiences may be continuously passed on and compromise the quality of training delivered in the future.

Career post internship

From an individual's point of view, the internship year/years are the time when trainees are about to make their first career decisions; in most countries these junior doctors would enter the labour market and decide on their first post-internship job (34). The frequent and short rotations between different clinical teams during internship sometimes form these junior doctors' perceptions of professional roles and identities and they are important in informing opinions about whether they want to continue medicine in that organisation and country, and if so which specialty career seems most attractive (24,35,36).

From the system perspective, internship is an important timepoint of labour market transition into employment. For countries with workforce shortages, it seems important to retain and absorb these post-internship doctors within the health system and the public sector. Table 1 presents the number and percentage of doctors that exited or were absorbed by the public sector after internship and qualification in selected countries. Exits after internship is a challenge for both high-income countries and LMICs: Almost two-thirds of Irish interns intended to migrate abroad to practise medicine (37); 19% of the UK foundation year (FY) 2 trainees planned to work outside the UK, take a career break or leave medicine permanently in 2019 pre-Covid-19 (38); for Kenya and Tanzania, the absorption of post-internship medical officers into the public sector was as low as 45.8% (39) and 44.3% (9) respectively. The reason for low absorption could be due to both supply and demand-side challenges where doctors do not want to work in the public sector or there aren't adequate job opportunities. It is also noteworthy that exits after

internship have a significant financial cost to the host organisation and country (40), as medical education is typically highly subsidised by the public sector, especially in LMICs (41). Evidence from LMICs suggests substantial exits and migration to high-income countries immediately after qualification (42–44), causing “brain drain” and huge financial losses – the loss of returns from government investment for doctors’ education could be as high as US\$ 127,221 per doctor, a total of US\$ 2.2 billion loss for 9 sub-Saharan African countries according to Mills et al.(41)

Table 1. The number/percentage of medical doctors exited or absorbed by the public sector after internship and qualification in selected countries

Country	Year	Sampling	Summary	Directly after internship or unclear	Career intention or actual destination ¹
China (45)	2019	National	59.1% continued graduate studies with medical residency, 7.2% worked in tertiary hospitals, 1.7% worked in community hospitals, 4.3% continued individual medical residency. - At least 20% of medical doctors when graduated were not absorbed into clinical practice: 15.7% continued graduate studies without residency, 5.4% still finding a job, 2.0% went abroad, 1.7% worked in government, 1.5% worked in community government, 1.0% worked in company and 0.5% started up own company.	Direct	Destination
Democratic Republic of the Congo (46)	2007-2018	National	- Surveyed across DRC and abroad, included 566 physicians in the survey 45% of physicians unemployed, 87% remained in DRC	Unclear	Destination
Ireland (37)	2018	National	Almost two thirds (64%) of the 210 respondents intended to go abroad to practise medicine, with 57% intending to return to Ireland to continue their medical career and 7% intending to leave Ireland permanently; 36% intended to remain in Ireland to practise medicine	Direct	Intention
Kazakhstan (47)	2011-2012	2 universities	Out of 275 interns, 173 intern would work in a profession (63%), 67 probably would not work in a profession, 6 planned not to work in a profession.	Direct	Intention
Kenya (39)	2015-2018	National	- Estimated 1800 new stock (registered) between 2015-2018, 825 employed by the public sector from 2014-2018. The public sector absorption rate 45.8% - Additional estimated 578 employed by the private sector (calculated as 70% of the public sector). Total absorption rate 77.9%	Unclear	Destination

¹ “Career intention” refers to medical students or interns intending to work in the public sector after internship and qualification, and “actual destination” refers to medical students or interns eventually work in the public sector after internship and qualification.

Peru (48,49)	2007-2011	National	• 2012 SERUMS (internship) 2496, 2013 public system entrants 613 (25%) • 2011 SERUMS 2188, 2012 public system entrants 372 (17%) • 2010 SERUMS 1905, 2011 public system entrants 599 (31%) • 2009 SERUMS 2001, 2010 public system entrants 686 (34%) • 2008 SERUMS 1719, 2009 public system entrants 564 (33%)	Direct	Destination
Portugal (50)	2014	National	• A national-wide, cross-sectional, observational, questionnaire-based study, administered to Portuguese junior doctors who were still in the one-year compulsory general residency. • A total of 55% of Portuguese junior doctors stated they considered working abroad in the next 10 years.	Unclear	Intention
Sierra Leone (51)	2016	National	• Sierra Leone only has one medical school producing 30-50 medical officers per year • 100% of medical officers were assumed to enter the public health workforce	Direct	Destination
South Africa (52)	2002-2010	National	• MBChB graduates 11700 from 2002 and 2010, but the number of doctors employed by the public sector was only 4403, the absorption rate was only 38%	Unclear	Destination
South Africa (53)	2007-2011	Single university	• Surveyed all doctors graduated from one university from 2007 and 2011 • Out of 497 South African respondents, 89% worked as doctors in South Africa, 6.8% practised medicine outside the country, and 3.8% no longer practise medicine. 80% of the 89% doctors work in the public sector. Absorption rate is 70%.	Unclear	Destination
South Africa (54)	2016	Single hospital	• Surveyed 41 interns out of 78 all interns in the hospital • 2 (5%) interns planned to emigrate, 7 (17%) to work overseas to gain experience, 12 (29%) to work in the public sector for the purpose of specialisation, 3 (7%) to work in the public sector but not necessarily to specialise, 14 (34%) were undecided and 4 (7%) to work in the private sector in South Africa. Many cited the uncertainty of posts and their future in the public health sector as a reason for their uncertainty concerning their future plans.	Direct	Intention
Tanzania (9)	2010	National	• In 2010 the government provided only 280 immediate postings to 632 medical school graduates (44.3%)	Direct	Destination

Tanzania (55)	NA	Subnational	15%-20% of health workers left after graduation, another 10% of graduating health workers left the health workforce within one year of employment, but after that period, retention was relatively high (unclear data source)	Unclear	Unclear
Thailand (56)	2012	National	Out of 754 new graduates, given having freedom to choose workplace, 390 (52%) prefer to work in community hospitals, 90 (12%) in provincial hospitals, and 230 (31%) chose other workplaces outside the public sector or wished to continue further education	Direct	Intention
Uganda (57)	2009	3 cohorts (2005-2007) from two universities	92% surveyed are in Uganda, 8% migrated abroad - Of respondents currently in Uganda, 31.5% worked with NGOs, donor and private not-for-profit, 23% worked in district and sub-district, 6.1% worked in regional and national referral, 22.7% did postgraduate training, 12.4% worked with private for profit, 1.5% in academic, 0.6% with Uganda People's Defence Force, 0.9% unemployed, 1.2% administrative jobs.	Unclear	Destination
UK (38)	2019, 2020	National	- In 2020, 12% of the UK foundation year 2 trainee planned to work outside the UK (7%), taking a career break (4%) or leave medicine permanently (1%) [Potential impact of Covid-19 to retention] - In 2019, 19% of the UK foundation year 2 trainee planned to work outside the UK (11%), taking a career break (7%) or leave medicine permanently (1%); meanwhile the percentage is 7% for all doctors (2.7%, 3.4% 0.9%)	Direct	Intention
UK (58)	2018	National	- Taking a break immediately after completing the Foundation Programme is increasing; from 30% after 2012 to 54% after 2016 - Nearly 90% of doctors who completed the Foundation Programme go on to enter specialty or core training in the UK within three years. - The most common reasons for taking a break fall into three themes:1) health and wellbeing 2) uncertainty about specialty choice or career direction 3) dissatisfaction with the training environment.	Direct	Intention
Viet Nam (59)	2008	Unclear	A study of 463 doctors and nurses graduating between 2005 and 2008, showed that in 2008 79.6% of doctors and 87.5% of nurses had found work in the public or private sector	Unclear	Destination

1.3. Kenyan context and background

The country / setting of focus for this thesis is Kenya, which is a country with a severe shortage of medical doctors and also an underutilisation challenge as many newly qualified and registered doctors are not absorbed by the public sector. As Kenyan medical schools are training and graduating increasing numbers of doctors in the hope of helping the country achieve UHC, it seems timely to gain a better understanding of what happens to these doctors. In this section, I present Kenya's country and health system context, informed by a review of the literature and relevant policies (Table 2).

Table 2. Health system and workforce related policies in Kenya

Author	Year	Title	Area of focus
MOH	2018	Kenya Health Sector Strategic Plan (KHSSP) July 2018-June 2023	Health sector
Kenya Vision	2018	Kenya Roadmap Towards Universal Health Coverage, 2018–2022	UHC
MOH	2018	Transforming Health Systems for Universal Health Coverage, Social Assessment	UHC
MOH	2018	National and County Health Budget Analysis FY2016/17	Financing
MOH	-	National Health Account 2001, 2005, 2009, 2012, 2015	Financing
MOH	2018	Research for Health Policy	Research
MOH	2018	Research for Health Priorities	Research
MOH	2016	Kenya County Health Accounts	financing
Kenya Paediatrics Association	2018	Kenya Paediatrics Association Strategic Plan, 2018-2022.	Health sector
MOH	2018	Kenya Harmonised Health Facility Assessment for UHC	Health sector
MOH	2019	A Case for Increasing Public Investments in Health Raising Public Commitments to Kenya's Health Sector.	Health sector
MOH	2010	Service availability mapping	Service
MOH	2014	Kenya Health Sector Strategic and Investment Plan 2014-2018.	Health sector
MOH	2014	Kenya Health Policy 2014-2030	Health sector
MOH	2017	Health Infrastructure Norms and Standards	Health sector
MOH	2016	Statistical review of progress towards the min-term targets of the Kenya Health Sector Strategic Plan 2014-2018	Health sector
MOH	2013	Kenya Health Sector Strategic & Investment Plan 2013-2017.	Health sector

MOH	2013	Kenya Health Sector Strategic Investment Plan 2013-2017	Health sector
MOH	2015	Kenya Health Workforce Report: The Status of Healthcare Professionals in Kenya.	HRH
MOH	2014	Health Sector Human Resources Strategy 2014 – 2018	HRH
Office of Prime Minister	2010	Guidelines on Human Resource Planning for Ministries and Departments.	HRH
Public Service Commission	2014	Policy on decentralisation of human resources management in the civil service	HRH
MPDB	2019	Approved Institutions for MBChB and BDS Training	HRH
MOH	2011	Human Resource for Health in the Constitution of Kenya Transition Work Plan 2011-2014	HRH
MOH	2014	Human Resource for Health Norms and Standards Guidelines.	HRH
MOH	2017	Kenya Task-shifting Policy.	HRH
MOH	2019	Human Resources for Health Gaps and opportunities for strengthening.	HRH
MOH	2015	Report of the Training Needs Assessment of Kenya's Health Workforce.	HRH
MOH	2017	Task Sharing Policy Guideline	HRH
MOH	2009	National Human Resources for Health Strategic Plan 2009-2012.	HRH
IntraHealth	2015	Human Resources for Health Country Commitments: Case Studies from the Dominican Republic, Kenya, Mali, and Uganda	HRH
IntraHealth	2017	Human resource for Health in Kenya: A stock and flow review	HRH
USAID	2019	Kenya Devolution Fact Sheet	Devolution
USAID	2019	Kenya Health System Assessment	Health sector
USAID	2018	Kenya Health Financing System Assessment	Financing
WHO	2013	Understanding the labour market for HRH in Kenya.	HRH
MOH	2019	Refocusing on quality of care and increasing demand for services; Essential elements in attaining universal health coverage in Kenya	Health sector
MOH	2019	Human Resources for Health Strategic Plan (KHRHSP) 2019-2023	HRH

[Kenya country context](#)

The Republic of Kenya (hereinafter referred to as Kenya) is an East African country covering 582,646 square kilometres in size and bordered by Ethiopia (to the north), Somalia (northeast), Tanzania (south and southeast), Uganda (west) and South Sudan (northwest). Kenya reformed its constitution in 2010 through decentralisation and

devolution, which created the national and 47 semi-autonomous county governments, established after the 2013 elections (60).

Table 3 provides a comparison of Kenya's key economic, social and health characteristics with its neighbours Uganda and Tanzania. As a lower-middle-income country, Kenya has and continues to achieve steady and robust economic growth, with a Gross Domestic Product (GDP) per capita of US\$ 2,007 and a 7.5% GDP growth rate in 2021, significantly higher than its neighbours (61). With a 55 million population in 2021, Kenya's population is growing more slowly than other sub-Saharan African countries (61). While Kenya has significantly reduced its maternal and under-five mortality, from 708 per 100,000 live birth in 2000 to 342 in 2017 and 99 per 1,000 live birth in 2000 to 42 in 2020 respectively (60), maternal and neonatal diseases, HIV/AIDS, and other sexually transmitted diseases, respiratory infections and tuberculosis continue to be the highest causes of disease burden for the country (62,63).

Table 3. Kenya's key characteristics and comparison with Uganda and Tanzania using data from the World Bank, the World Health Statistics, and the Global Burden of Diseases study

	<i>Kenya</i>	<i>Uganda</i>	<i>Tanzania</i>
Key economic indicators (61)			
Gross Domestic Product (GDP) per capita in current US\$, 2021	2,007	858	1,136
GDP growth in annual %, 2021	7.5	3.4	4.3
Unemployment rate % of total labour force, 2021	5.7	2.9	2.6
Key social indicators (61)			
Population, 2021	54,985,702	47,123,533	61,498,438
Population growth in annual %, 2021	2.2	3.0	2.9

Poverty headcount ratio at US\$2.15 a day (2017 PPP), 2015	29.4	42.2	44.9
Urban population %, 2021	28	26	36
Key health indicators (62,63)			
Maternal mortality ratio per 100,000 live births, 2017	342	375	542
Under-five mortality rate per 1,000 live births, 2020	42	43	49
Top 5 causes ranked by DALYs	- HIV/AIDS & sexually transmitted diseases - Maternal & neonatal - Respiratory infection & Tuberculosis - Enteric infections - Cardiovascular diseases	- Maternal & neonatal - Neglected tropical diseases & malaria - HIV/AIDS & sexually transmitted diseases - Respiratory infection & Tuberculosis - Other non-communicable	- Maternal & neonatal - Respiratory infection & Tuberculosis - Other non-communicable - HIV/AIDS & sexually transmitted diseases - Neglected tropical diseases & malaria
Diphtheria-tetanus-pertussis (DTP3) immunisation coverage among 1-year-oldst%, 2020	89	89	86
Universal health coverage index in %, 2019	56	50	46
Domestic government health spending per capita in current US\$, 2019	38	5	16
Domestic government health spending as a % of general government spending, 2019	8	3	10
Domestic government health spending as a % of total health spending, 2019	46	15	41
Out-of-pocket spending as a % of total health spending, 2019	24	38	22

Health system in Kenya

Healthcare in Kenya is guided by several development blueprints and policies such as Vision 2030, the Kenya Health Policy Framework 2014-2030, and a series of Kenya Health Sector Strategic and Investment Plans (Table 2). These policies and plans aim to provide robust health infrastructure, strengthen service delivery and development of risk-pooling financing mechanisms as the country strives to attain UHC.

Alongside broad government reform and devolution, the health system in Kenya also underwent changes with greater decision-making autonomy devolved to county governments, with goals to strengthen democracy and accountability, increase community engagement and improve health system efficiency (64,65). Before devolution, the health system was largely managed centrally by the national Ministry of Health (MOH). After devolution, MOH's role is largely focused on health policy and standards formulation and management of national referral services. In each county, county governments oversee the management and allocation of resources and county-level health services delivery. These include an executive arm consisting of the Governor, the deputy Governor and members of the County Executive Committee (CEC) that each represents one county government department; and a legislative arm which is the County Assembly. Each county has a county health management team led by a chief officer for health with sub-county health management teams responsible for health facilities at their corresponding level (64,66,67) (Figure 2).

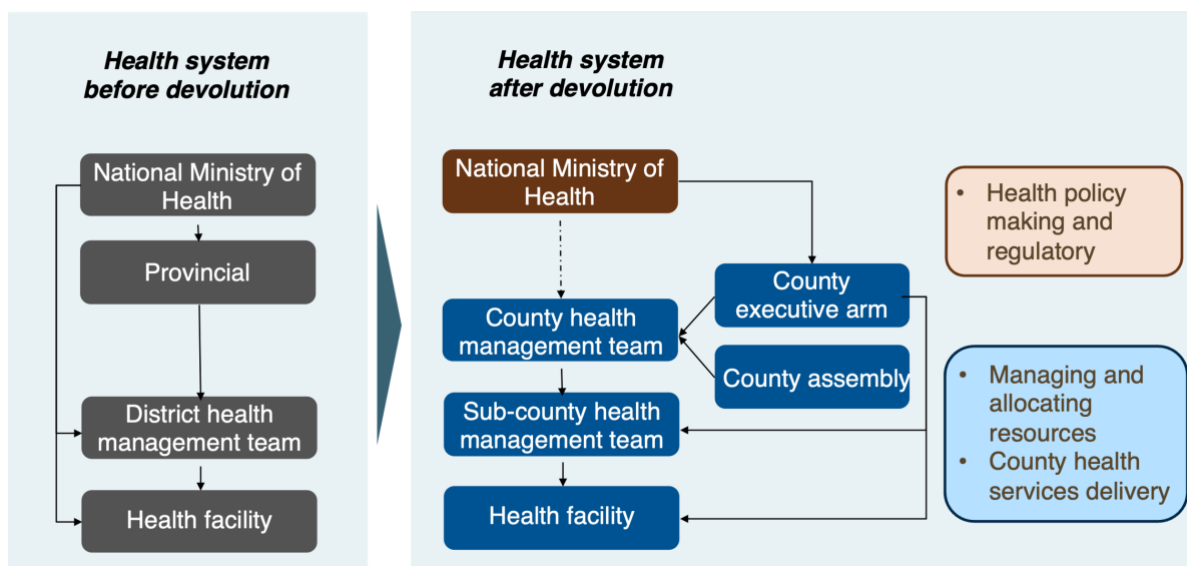


Figure 2. Health system before and after devolution

Source: (65)

The Kenyan health system is currently organised into six levels of service delivery, with levels 1 – 5 being managed by the county government post-devolution. Level 1 community health centres are responsible for community health services; Level 2 dispensaries and Level 3 health centres are responsible for primary care particularly basic outpatient services; Level 4 primary care hospitals (county and sub-county referral hospitals) and Level 5 secondary care hospitals (regional referral hospitals) for secondary care, including specialised outpatient and comprehensive inpatient services and Level 6 tertiary care hospitals (national referral hospitals) for tertiary referral care, which offer highly specialised care and managed by the national government (60,66,68).

The public sector provides the largest share of healthcare in Kenya. Approximately 46% of health facilities are run by the government in 2022, 44% by the private sector and the rest by faith-based and non-governmental organisation (69). However, the public sector provides a much greater proportion of inpatient hospital care particularly to the poor and

those in rural areas (70), as the costs of utilising public hospital services are much lower. Additionally, a very large number of private sector facilities are Level 2 small clinics and dispensaries (71).

As for health financing, the Kenyan government has set ambitious targets for advancing UHC including financial protection. While government expenditure for health has increased over the past decade (from US\$ 17 per capita in 2010 to US\$ 38 in 2019), it has stagnated relative to GDP (1.8% in 2010 and 2.1% in 2019) and total government spending (7.3% in 2010 and 8.3% in 2019) (60,61). The national government announced in 2013 that user fees were abolished at primary healthcare facilities, and free maternal care services and services for children under 5 years old were introduced in public health facilities, and later in 2015 similarly for reproductive services and emergency medical treatment as a right by all people (67,72). The government also introduced several rounds of reform to its main health insurance scheme – the National Hospital Insurance Fund (NHIF) although its coverage has been low (16% of Kenyans), and 32 private insurances collectively cover only roughly 1% (73,74), leaving the population vulnerable to out-of-pocket payment.

Human resources for health by cadres

Kenya has 13 major cadres of health workers including doctors, nurses and midwives, clinical officers, dentists, dental technologists, pharmacists, pharmaceutical technologists, physiotherapists, occupational therapists, orthopaedic technologists, nutritionists and clinical dieticians, medical laboratory technologists and public health officers (75). I hereby focus primarily on doctors, and to some extent nurses, midwives and clinical

officers in this section. The numbers and gaps (based on staffing norms developed from essential package of service delivered (76)) as well as costs for these major cadres are shown in Table 4 and Appendix 3. As shown in the appendix, there is a huge discrepancy in terms of the numbers for these major cadres according to different data sources.

Medical officers (MO) are typically trained in one of 11 medical universities (as of 2018) in Kenya through a Bachelor of Medicine & Bachelor of Surgery (MBChB) programme that lasts 6 years with an additional internship year. Eight of these universities are public and 3 are private. MOs could further advance their training through Master of Medicine programs in different specialties, formal post-graduate degrees almost exclusively offered by universities, and become medical specialists. The MOH Labour Market Analysis for 2020 indicated that there are a total of 12,792 medical officers and specialists (75), similar to the number in the HRH Strategic Plan 2019-2023 (data from iHRIS) (39), however the number reported from each county summed up only to 4,432 according to the Kenya Health Sector Strategic Plan HRH mid-term review (77). The difference in those data could potentially be attributed to the difference in the number of workers registered with the national professional body vs. could be tracked down by national and county governments. Nonetheless, different sources of data all highlighted the significant gap for MOs and specialists when compared with targets from HRH Norms & Standards Guidelines (2014) (76). It should also be noted that MOs are highly concentrated at the hospital-level (Level 4 and above) – despite that the HRH Norms and Standards Guideline (2014) requires at least two MOs in Level 3 comprehensive health centres (76). As for costs, undergraduate training cost for MOs is roughly US\$ 23,000 in total and their salary cost if on permanent and pensionable terms is recommended at roughly US\$ 2,100 per

month with an estimated additional US\$ 580 linked to different types of allowances (78,79).

Clinical officers (COs) are non-physician clinicians common in African countries since the colonial era. They take on many diagnostics and clinical functions of medical doctors, and task-sharing with COs and nurses are especially important in countries with physician shortages for delivering and scaling up programmes such as HIV/AIDS, immunisation, acute infectious diseases, and nutrition (80). In Kenya COs are trained in universities and Kenya Medical Training Colleges through shorter (3-4 years) diploma or Bachelor of Science program. They can further advance their training through higher diplomas and master courses and become specialist COs in certain specialties, commonly in anaesthetic, Ear, Nose and Throat (ENT), paediatrics, ophthalmology. Similarly the MOH Labour Market Analysis (referred to above) suggested a stock of 25,400 clinical officers (75) whereas county reporting only added up to 7,703 (77). Training costs for CO range between US\$ 3,000 to 7,000 and their monthly salary cost is roughly US\$ 840 (78,79).

Table 4. Summary of number, gap and costs for different cadre health workers in Kenya

	Total number	Gap/norms	Number in training	Cost
Medical officer and specialist	- Medical officer numbers range from 2,876 (in 2020) (77) to 7,884 (in 2020) (75) - Medical specialist number range from 1,556 (in 2020) (77) to 4,908 (in 2020) (75)	Estimated gaps for MO 3,238 and specialist 2,313 (in 2020) (77)	Training output of medical students 573 (in 2018) (39)	- Training cost for MBChB self-sponsored tuition (searched in Dec 2020) roughly Ksh 2,800,000 (US\$ ~22,600) (81–83) - Training cost for MMed self-sponsored tuition (searched in Dec 2020) roughly Ksh 608,800 (US\$ ~5,455) (84) - Salary cost (monthly) for medical officer interns Ksh 145,000 (US\$ ~1,200) (78,79) - Salary cost (monthly) for medical officer Ksh 250,000 (US\$ ~2,100) (78,79) - Additionally, extraneous allowance, housing allowances, risk allowances (roughly Ksh 40,000, US\$ ~330) and specifically for MOs also emergency call allowances (Ksh 30,000, US\$ ~250)
Clinical officer (generalist & specialist)	- General clinical officer numbers range from 6,279 (in 2020) (77) to 23,190 (in 2020) (75) - Specialist clinical officer number range from 1,424 (in 2020) (77) to 2,210 (in 2020) (75)	Estimated gaps for CO Specialist gap 3,970, CO general 9,301 (in 2020) (77)	Training output of clinical medicine students 2,771 (in 2018) (39)	- Training cost for self-sponsored tuition (searched in Dec 2020) range from Ksh 362,100 Ksh (US\$ ~3245) (85) to 868,000 Ksh (US\$ ~7,788) (83) - Salary cost (monthly) for registered clinical officer Ksh 100,000 (US\$ ~840) (78,79) - Additionally, extraneous allowance, housing allowances, risk allowances (roughly Ksh 40,000, US\$ ~330)
Nurse & midwives	- Registered nurse numbers range from 24,191 (in 2020) (77) to 71,539 (in 2020) (75) - Enrolled nurse number range from 8,475 (in 2020) (77) to 38,120 (in 2020) (75)	Estimated gaps for nurses 38,548 (in 2020) (77)	Training output of nursing and midwifery students 4,183 (in 2018) (39)	- Training cost for self-sponsored tuition (searched in Dec 2020) range from Ksh 362,100 Ksh (US\$ ~3,245) (85) to 1,215,600 Ksh (US\$ ~10,896) (83) - Salary cost (monthly) for registered nurse and enrolled nurse Ksh 94,000 to 100,000 (US\$ ~790 to 840) (78,79) - Additionally, extraneous allowance, housing allowances, risk allowances (roughly Ksh 40,000, ~US\$ 330)

As for nurses and midwives, there are two common cadres including registered nurses (require 3.5-year diploma or 4-year Bachelor's degree) and enrolled nurses (require 2.5 years certificate). The latter are entry-level nurses and in theory work under the supervision of registered nurses (86). The MOH Labour Market Analysis suggested a stock of 109,659 nurses ever licensed (75) and the county reporting which includes both public and private sector summed up to 32,666 nurses (77) and both sources highlighted that the majority of these nursing staff are within the public sector. Training costs for nurses range between US\$ 3,000 to 11,000 and their monthly salary cost is roughly US\$ 790-840 (78,79).

Training and qualification of medical officers

As shown in Figure 3, MOs are typically trained through an MBChB program, with each year focusing on different aspects of basic and clinical sciences. In the last year of medical training, students are required to undergo one year of internship training in one of 74 government-recognised internship training centres that include rotations in different specialties (surgery, internal medicine, obstetrics and gynaecology [OBGYN] and paediatrics; more recently community health and psychiatry were added). Students sign up and ballot for internship hospitals though could be allocated to other hospitals depending on the popularity of facilities. During the internship, an internship logbook is required to be signed by supervisors, which lists out the competencies medical interns are expected to develop e.g. compulsory procedures that should be carried out either independently or under supervision (87). After successfully completing the internship and subsequent licensure by the Kenya Medical Practitioners and Dentists Council (KMPDC) individuals can practise medicine unsupervised as general MOs in different types of

facilities including public, private and faith-based hospitals. Previously, when employed by the county government, MOs could be sponsored and supported by county government for Masters of Medicine training (a “study leave”) usually after working for three or more years as MOs with the condition that they return to the county after training. However anecdotal evidence suggests that this has become less common nowadays.

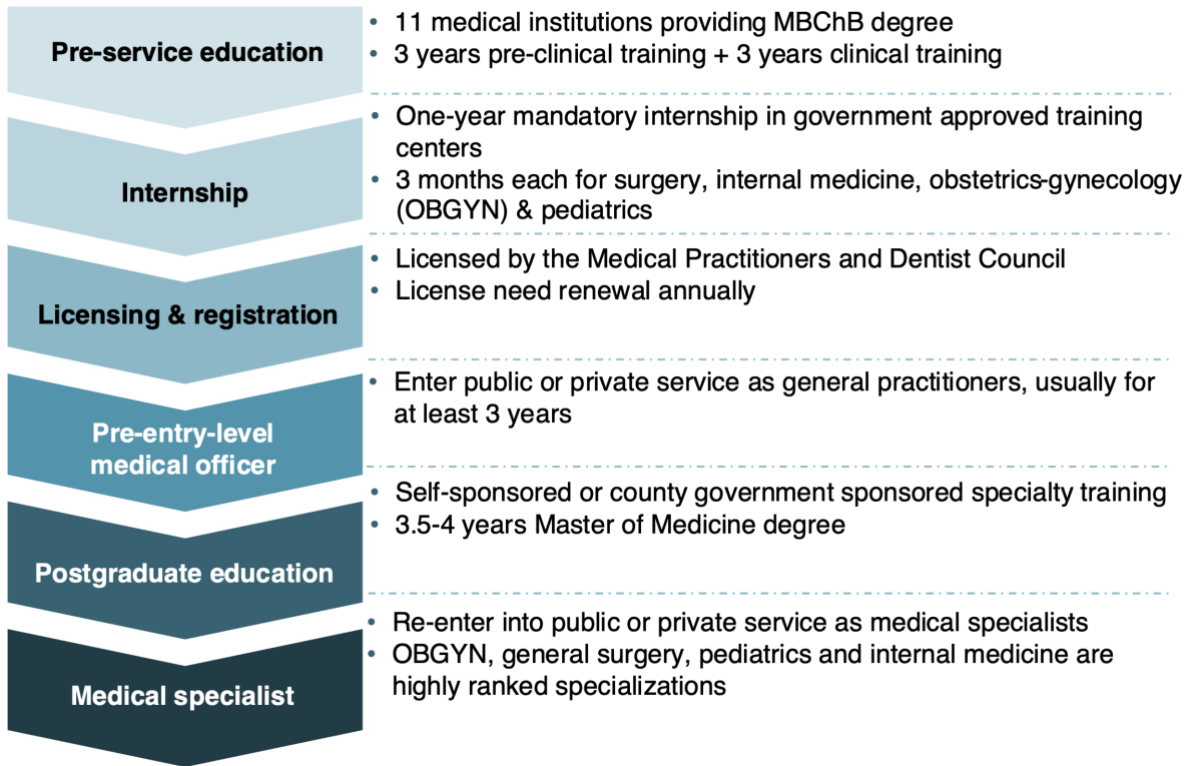


Figure 3. Training and career pathway of medical doctors in Kenya

As with other African countries, medical schools in Kenya are expanding to meet HRH gaps. For a long period of time Kenya only had two medical schools: the University of Nairobi School of Medicine, the first and largest public university in Kenya established its faculty of medicine in 1967 and now continues to produce the largest number of medical graduates; the Moi University School of Medicine situated in the Rift Valley is the second medical school in Kenya with the first intake of medical students in 1990 (88). Medical

universities and training used to be completely publicly financed and intake-restricted but more recently there has been an expansion of self-funded students, and three private universities now are providing medical training (88). Now a total of 11 medical schools are providing undergraduate medical training with a combined annual output of 628 in 2019 (89), nearly double that only a few years previously (287 in 2006, 320 in 2016) (39,75,90). Correspondingly the number of internship training centres also dramatically expanded from 6 to 74 over the past 15 years (21,91). Many new training centres that were formerly district hospitals but are now county hospitals in Kenya (at Level 4 of its 6-level health system) became recognised as internship centres alongside more established regional and national hospitals (at Level 5 and 6 respectively). With the expansion of medical schools and internship training centres, there are also concerns with the quality of the learning environment in undergraduate medical education as well as internship training as many newly accredited internship training sites lack organisational structures and basic resources and some suggested that they are “not organised for training purposes” (21).

Human resources for health management and stakeholders

A series of different actors are involved in HRH management in Kenya (Table 5). Following devolution, the national government’s role is more restricted to HRH-related policy and standards formulation, for example the National Public Service Commission oversees the entire public services in Kenya and the Salaries and Remuneration Commission regulates the remuneration of public sector employees in the country. Additionally the MOH is still responsible for the placement and salary payment of different interns (medical, pharmacists, clinical officers, nurses, etc.) to different counties (60).

Table 5. Different stakeholders involved in human resources for health especially related to medical officers in Kenya

Stakeholders	Role and mandates
National Ministry of Health	Development of national policy and standards including for HRH, provision of technical support at all levels, and management of national referral services. Also chairs the National HRH Inter-agency Coordinating Committee that focuses on HRH planning, management, and system and policy development.
National Public Service Commission	Overall management and oversight for national government employees, and oversight of the entire public service both at national and county level.
National Salaries and Remuneration Commission	Regulation of salaries and remuneration of all public sector employees.
County Department of Health	Management of the health workforce on a daily basis. Some counties also chair intercounty HRH stakeholders' coordination forums similar with the National inter-agency coordinating committees.
County Public Service Board	Overall management and oversight for all county government employees including healthcare workers' recruitment, deployment, management, promotion and retention.
Health Professions Oversight Authority	Regulation of health training, professions, health facilities and services.
Kenya Medical Practitioners and Dentists Council	Accreditation of training institutions and individual medical practitioners, establishment of standards of practice as well as regulatory requirements.
Kenya Medical Association	Professional association representing the interests of the profession.
Kenya Medical Practitioners and Dentists Union	Trade union representing the welfare of the profession.
Training Institutions	Provide pre-service training for medical officers.

Source: (60,64,66,92–94)

At the county level, the county Department of Health has the mandate of managing the health workforce and improving HRH systems, and the county Public Service Board oversees human resources management across all sectors at the county level, including health workers' recruitment, in accordance with the County Government Act (93,95). Their work is guided by different policies and standards such as the National Public Service Commission's *Policy on decentralisation of human resources management in the civil service* (96) and MOH's *Human Resource for Health Norms and Standards Guidelines*

(76). Such recruitment could be on permanent and pensionable (PNP) or contract terms (Table 6). HRH makes up roughly 60-70% of all counties' public sector employees and correspondingly is a large expenditure (93). While the County Governments Act requires counties to keep their total wage bill below 35 percent of total county expenditure (95), many counties spend over half of their health budget on health worker wages (60). In Machakos county for example, health workers' wage bills contributed to 74% of the county's health budget and 33% of the county's overall government budget (97).

Table 6. Employment terms for medical officers and other healthcare workers in the public service

Terms of service	Details
Permanent and pensionable (PNP) (98)	• Open-ended contract • Requires completion of six months probationary period • New employees aged 45 years and above usually not appointed on PNP term
Fixed contracts (6,66,96,98,99)	• Appointment on contract terms for employees who service on fixed term projects, who may not qualify for pension, etc. • Contract appointment will be limited to a maximum of three years but renewable • Also requires probationary period • Considered a cost containment measure for county government, however requires higher pension contribution • Some emergency hiring programs coordinated by the national government such as UHC hiring (3-year contract) targeting primarily nurses, clinical officers, laboratory staff and pharmacists • Significantly shortened the recruitment processes from years to as short as three months and could meet specific health needs such as for HIV/AIDS and Covid-19 • However these health workers are not promised absorption into the civil service by the end of their contract and sometimes there are disharmonised remuneration packages
Casual services (100)	• When service is required for no more than 24 hours and payment at the end of each workday • Less common for medical officers and other healthcare workers

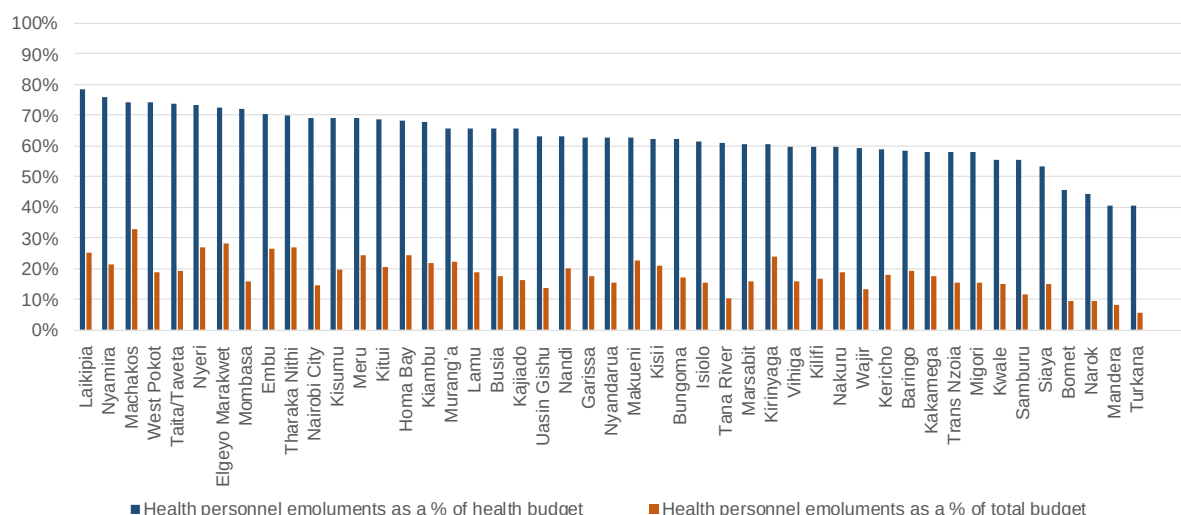


Figure 4. Health personnel emoluments as a percentage of county health budget and total budget, FY 2019/2020

Source: (97)

Health worker unionisation, pay bargaining and strikes

The 2010 new Constitution gave every worker the right to join a union and engage in collective bargaining. This prompted the formal establishment of the Medical Practitioners and Dentists Union, previously an activist Facebook group of young doctors focusing on their poor pay and difficult working environment (92). The broad uncertainties, fear and anxiety over HRH management and disruption in salary payments post-devolution eventually led to several waves of health workers' industrial actions and strikes (64,70,93). In 2013 a nationwide strike was called by three health workers' union and lasted several weeks, and then in 2016 and 2017 two much longer strikes happened (a 100-day doctors strike and 150-day nurses strike) due to failed negotiations between national and county governments with the union regarding the 2013 collective bargaining agreements (CBAs) on pay and working conditions (70). Strikes continue today regarding the 2017-2021 CBA implementation and PNP employment terms, even though these strikes are on a much smaller scale.

While strikes have led to a 100% raise in salaries and remunerations for MOs on PNP terms and better staffing and working conditions at least on paper, more doctors are now employed on fixed-term contracts with concerns over job security and counties face challenges to fund these positions in the long term. Moreover, the proposed steps to improve the work environment seem to be stagnated (92) and sacking of striking workers led to deepened mistrust of health workers towards the public system (70). Therefore, while considering medical internship training and labour market transition, it's important to keep the strike events in mind.

1.4. Thesis justification, aim and structure

Kenya is facing a severe HRH challenge, especially with the medical workforce. The training of medical doctors is a major investment and highly subsidised in Kenya, and the subsequent employment of these doctors is also a substantial investment for the public sector. Kenyan medical schools are training and graduating increasing numbers of doctors, but less than half of newly qualified and registered MOs seem to be absorbed by the public sector (39). Such low absorption could be due to the lack of job opportunities provided by county governments ("demand side"), being unwilling to work in remote areas or because the conditions MOs face as interns result in rapid burnout and stress-related psychological problems ("supply side"). As the majority of hospital care provided to the population is still through the public sector, especially in poor and rural areas (70), it is important that the Kenyan national and county governments are able to recruit and retain adequate numbers of qualified MOs in public hospitals, to ensure population access to care that is high quality and safe. Therefore, it seems timely to gain a better

understanding of the labour market for this profession in system terms and also in personal terms for medical doctors, especially during their labour market entry, i.e. during and post-internship period, as Kenya seeks to deliver UHC.

This DPhil thesis aims to **examine doctors' internship training experiences, subsequent labour market transition and absorption into the public sector in Kenya**. The overall thesis is informed by a simplified version of the health labour market framework, which primarily focuses on the supply and demand for workforce (101,102) and the conceptual framework will be introduced in detail in Chapter 2.

More specifically, I aim to understand:

- What is the internship training context and internship hospital capacity in Kenya?
(Chapter 3)
- What are the internship training experiences for doctors in Kenya and other LMICs? (Chapter 4)
- How do internship training experiences influence doctors' future career intentions and decisions in Kenya and other countries? (Chapter 5)
- How are medical doctors absorbed into Kenya's public sector after internship?
(Chapter 6)

While the primary country / setting of focus for this DPhil thesis is Kenya, such challenges are common in many other LMICs, especially in East Africa. Therefore, I also aim to develop a set of frameworks and tools on internship experience, career transition and absorption that are applicable and could be adapted for other LMICs. This thesis also

showcases how this set of frameworks and tools could be used in practice and brought together to inform policy as shown in Chapter 7.

Chapter 2. Methods overview

In this chapter, I provide an overview of the study design, data collection and analytical methods for the thesis. Detailed methods for each study objective will be provided within corresponding chapters.

In order to answer my research questions, I used a **multiple-method approach** (103) spanning quantitative and qualitative methods, literature-based reviews and empirical studies. In some cases, such as in Section 4B I used a formal “mixed-methods” approach to answer specific questions surrounding internship experience of Kenyan doctors. Figure 5 presents an overview of *data collection methods*. A total of seven data collection activities have been conducted and I will introduce them briefly in this chapter. Some of these activities focused specifically on Kenya, including interviews with Kenyan medical officers, while others such as literature-based reviews and scale development and validation have a broader scope (either global or all LMICs). In this thesis I present the findings in sequence, however much of the work was conducted in parallel with learning in one area often informing another. A detailed Gantt chart is provided in Appendix 2. Additionally, some of the collected data were analysed for multiple purposes to address different questions, such as the semi-structured interviews with MOs and consultants, which were fed into three different chapters (Section 4B, Section 5B, and Chapter 6).

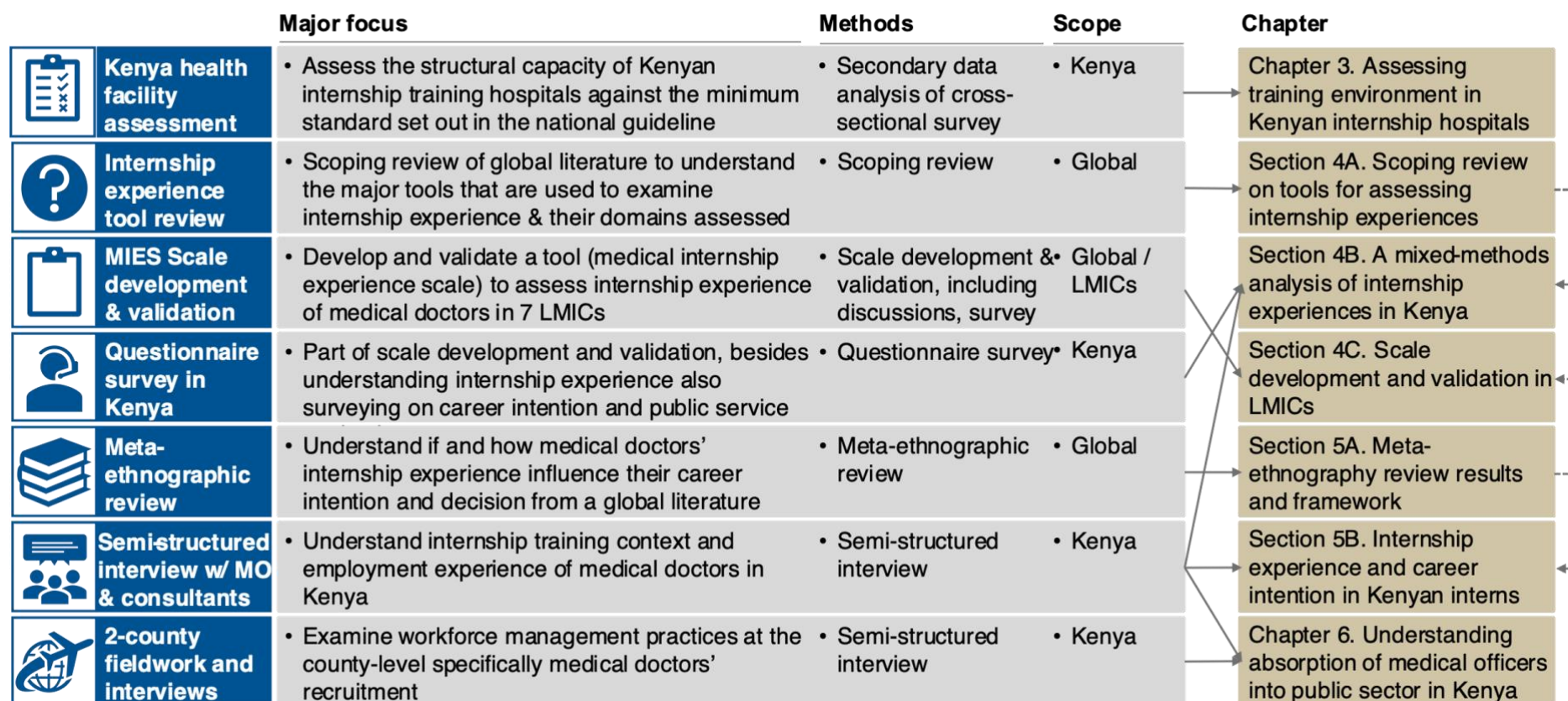


Figure 5. Overview of data collection methods

Note: The solid arrows refer to where the data collected are being analysed, and the dash arrows refer to where the results from the previous section are directly fed into the next section.

2.1. Conceptual framework

My overall conceptual framework is informed by several existing frameworks, including the health labour market framework developed by Soucat et al. (5) which has been explained in detail in Section 1.1. The health labour market framework points out that the employment of the workforce is a balance between the supply and the demand of health workers, and non-equilibrium could lead to unemployment and/or underemployment.

While the demand for health workers is ideally linked with population needs based on the local disease burden and service delivery arrangements (estimated with tools such as the Workload Indicators of Staffing Need [WISN] methods (104)), in practice, it is largely driven by what the government (or private sector, donors) perceive are needed and are willing and able to hire (101,105). On the contrary, the supply of health workers refers to how many trained staff are available (linked with the education sector and medical training) and how many of them are willing to accept the pay and conditions for certain jobs (101).

Many researchers have investigated different factors that influence health workforce career motivations. This includes WHO's report on factors related to health workers' preferences for rural and remote areas which are influenced by personal, family and community, financial, career-related, working and living conditions as well as bonding and mandatory services rules (106); Sanja et al.'s work on understanding factors that influence public sector employment concluded that this reflects socio-demographics, individual traits, work values, field of study, educational experience, public service motivation, and public sector reputation (107); Budhathoki et al.'s work summarised

medical students' motivation for rural area working into personal and lifestyle factors, medical training and curriculum factors, medical school factors, health facility factors and policy factors (108); The social cognitive career theory by Lent et al. (109) suggests the influence of personal, environmental and learning experiences shaped career goals and also performance (109,110). I combined and summarised this existing literature and theory into four broad factors; namely socio-demographics, personal values, medical school and training experience, and economic, policy, societal and cultural factors. One particular focus of my work is the internship, therefore I also separated this from medical training as one factor (Figure 6).

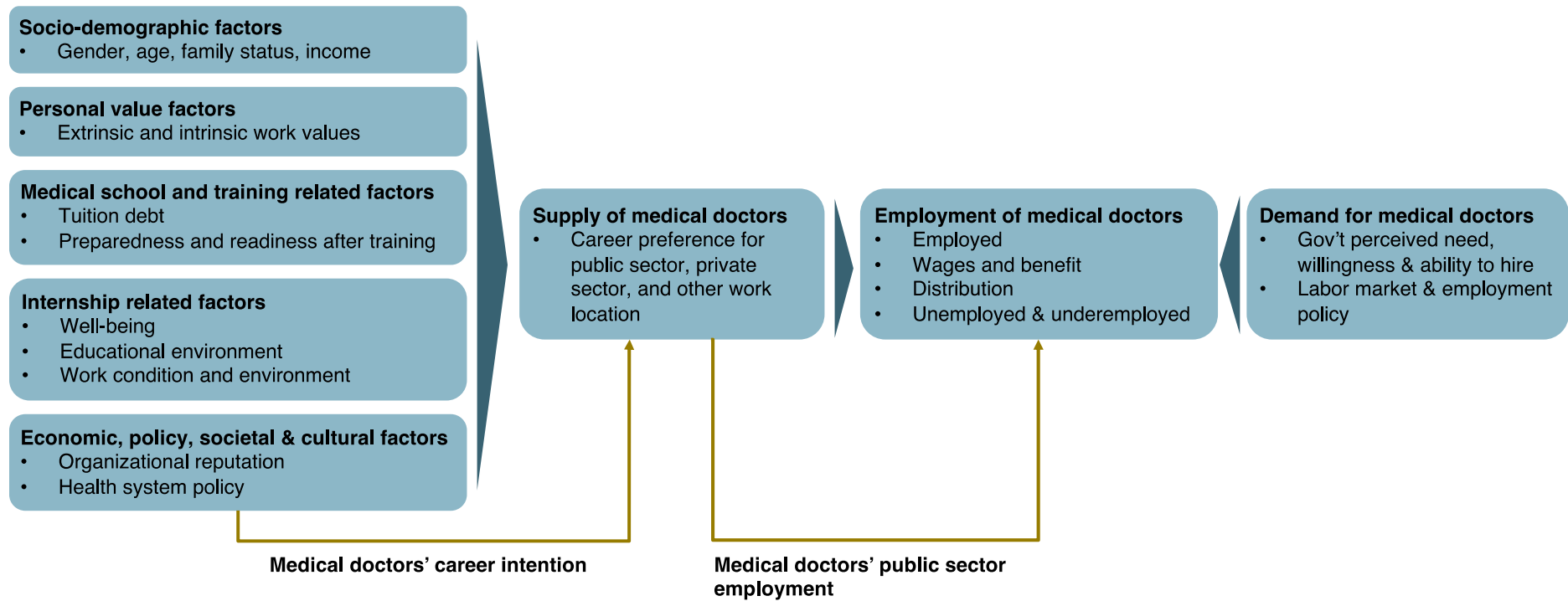


Figure 6. Thesis conceptual framework

It was not possible to examine all aspects of the conceptual framework, so I particularly focused on areas that are aligned with workforce planning and management as well as labour market transition. Linked to this I explored how Kenya provides internship training that enables graduates to become good practitioners and how it absorbs and recruits them. More specifically, my results are organised as:

- Internship-related factors such as the educational and work and environment, and wellbeing, examined in Chapter 3 and Chapter 4
- Medical doctors' career intention and how their internship experiences shape the intention, examined in Chapter 5
- Supply, demand and public sector employment of medical doctors at Kenya's county-level, examined in Chapter 6

2.2. Philosophical assumptions and research paradigm

My thesis is an example of health policy and systems research, which often focuses on “how health system actors understand and experience particular services or policies, and what social and political processes, including power relations, influence them” (111). This type of research commonly brings together multiple paradigms and perspectives, as well as different research designs and methods.

The whole piece of work is driven by *pragmatic* views. Pragmatism as a research paradigm emphasises the centrality of human experiences on beliefs, actions and knowledge production (112). Pragmatism focuses on practical implications and outcomes and recommends using the methods that best meet practical needs and purposes, for example the epistemology underlying a lot of mixed-methods studies is pragmatism

(103). Nonetheless, pragmatism here is an “umbrella worldview” for the study and many different chapters or sections of this thesis lean towards a particular paradigm. For example, the scale development and validation study despite incorporating qualitative cognitive interviews, is still predominately a *post-positivistic* research design as I try to measure human experiences and make claims for knowledge through reductionism using different psychometric properties and measurement theories (103). On the contrary, the meta-ethnography work is largely *interpretive and constructive* in nature, being focused more on understanding the phenomenon through participants and their views, and is more subjective and more aligned with a qualitative perspective (103). These different chapters, knowledge paradigms and research methods are brought together to address my research questions.

The following sections provide the *data collection methods* used in each piece of work, an overview of *data management and analysis* is provided in Section 2.10 and ethics and approval is provided in Section 2.11.

2.3. A secondary analysis of Kenyan health facility assessment on the capacity of Kenyan internship hospitals

This employs ***secondary data analysis*** to characterise the capacity of Kenyan internship hospitals and understand whether they are suitable to provide internship training for medical doctors in Kenya. I used secondary data from the Kenya Harmonised Health Facility Assessment (KHFA) 2018 (113), which is a cross-sectional survey conducted by the MOH that sampled 2980 out of 10,535 health facilities in Kenya, but purposely included all secondary hospitals, public primary hospitals and maternity and nursing homes. Sixty-

one out of 74 internship training centres were sampled in the KHFA. Together with my primary supervisor and other collaborators, I filtered and identified 166 indicators from the KHFA survey questionnaire and grouped them into 12 domains (HRH, laboratory test, oxygen and respiratory support, general equipment, 24/7 availability, infection prevention and control, quality and safety, surgery, internal medicine, OBGYN, paediatrics, mental health) that represent key elements of capacity for internship training provision as required in policy in Kenya. An overall readiness and capacity index was calculated as the mean of 12 domain-specific scores for each facility. The readiness index was used to explore the capacity of internship training centres compared to the minimum requirements outlined in the national guidelines. I also compared the readiness and capacity of each domain and the overall capacity between Level 4 small hospitals, Level 4 large hospitals and Level 5 & 6 hospitals, to understand the variations between different facilities. More information on the data source and indicators as well as results are provided in Chapter 3.

2.4. Scoping review of tools for assessing internship experiences

I tackled a literature gap by mapping the existing tools to measure medical internship experience, summarising the major areas assessed and highlighting the tools used in multiple studies or with psychometric properties assessed directly in the intern population under study. I used a **scoping review** approach, which is aimed to “map rapidly the key concepts underpinning a research area and the main sources and types of evidence available” (114).

I followed the five steps of Arksey and O'Malley method (114) for my scoping review. I searched MEDLINE, Embase, PsycINFO, ERIC, and the Cochrane Library for peer-reviewed studies that provided quantitative data on medical intern's (house officer, foundation year doctor, etc.) internship experience and were published between 2000 and 2019. I led a team of three including myself and two other reviewers (Peris Musitia and Mwanamvua Boga, research assistant and nurse manager from KEMRI-Wellcome Trust [KWTRP]) as we screened studies for eligibility with inclusion criteria. Data, including tools used, key themes examined, and the tools' psychometric properties within the study population were charted, collated, and summarised. Tools that were used in multiple studies, and tools with internal validity or reliability assessed directly in their intern population, were reported. Further details are provided in Section 4A.

2.5. Scale development and validation process for the medical internship experience scale

Informed by the scoping review, I ***developed and validated a new scale*** or tool, the "medical internship experience scale (MIES)", focusing on measuring the internship experience of medical doctors in LMICs. Scales measure latent constructs and specifically "behaviours, attitudes, and hypothetical scenarios we expect to exist as a result of our theoretical understanding of the world, but cannot assess directly" (115). The development of a new scale could help us measure a specific behaviour and experience.

I followed Boateng's 9-step framework for the development of MIES (115), with collaborators from Kenya and eight other LMICs involved at different stages of the scale development process. The nine countries varied in geographic locations, income levels,

and internship training models, which allowed me to understand and adapt my tool to fit a more general “LMIC” setting. Additionally, an open survey was also conducted capturing responses from medical doctors outside of these nine countries. Detailed information on the scale development and validation steps are listed as methods/results in Section 4B.

2.6. Questionnaire survey in Kenya to examine internship experiences of medical doctors

I conducted a ***cross-sectional, self-administered, online questionnaire survey*** to specifically understand the internship experience of medical doctors in Kenya. The questionnaire survey and MIES development and validation were conducted together initially, i.e. the scale and survey developed and used the same set of questions and sample population in Kenya. However, the two objectives were addressed by different data analysis and reporting stages. The MIES scale development work focused on how factors and constructs are identified and the scale’s reliability and validity, and is presented in Section 4C. The data analysed from the Kenyan survey that directly reports on actual internship experiences of Kenyan doctors is presented in Section 4B. The survey findings were triangulated and are reported together with qualitative data from semi-structured interviews with Kenyan doctors in Section 4B. In this thesis and for clarity of presentation I therefore differentiated the “scale development” and the “survey development and administration” as two data collection activities.

A survey questionnaire was developed as part of the scale development and validation process as explained further in Section 4B.2. Questions were identified using a deductive

approach by reviewing existing tools and indicators from the scoping review. Five tools were included and adapted (Postgraduate Hospital Educational Environmental Measure [PHEEM], Professional Quality of Life Scale [ProQOL], Perceived Stress Scale [PSS], Safety Attitude Questionnaire [SAQ] and Patient Health Questionnaire-9 [PHQ-9]) and additional questions on physical resources were added to highlight common challenges encountered during internship in LMIC. The questions were further revised through discussion with 12 medical interns in Kenya, 31 interns in 6 other LMICs, as well as through an expert panel validation, to ensure that all questions were most relevant to internship training. Lastly, I conducted pre-testing and cognitive interviews with 19 medical interns across different countries including three in Kenya to ensure that respondents could fully understand the questions as I intended (116,117). It should be noted that throughout this process I have revised original survey questions to make sure they are relevant to the internship and could be easily understood by Kenyan and other LMIC participants. Changes to the original tool items / questions were necessary, especially for tools like PSS and PHQ-9 which are originally intended for general populations. The final survey included 88 questions on internship experience (covering wellbeing, educational environment, and work condition and environment), 10 questions on sociodemographic and medical training, and 7 questions on career preference post-internship. All internship experience-related questions were standardised into a five-point Likert scale, either “very often – often – sometimes – rarely - never” or “strongly agree – agree – neutral – disagree – strongly disagree”. The survey questionnaire can be found in Appendix 4.

For survey administration, my population of interest was all current MO interns in Kenya as well as junior MOs who completed their internship within the past 3 years (after 2018 at the start of the survey). Details of the study population are provided in Section 4B. In summary, respondents were recruited using a mix of snowball and convenience sampling (118) through collaborators from Kenya Medical Association Young Doctor Network, Kenya Medical Practitioners and Dentists Council, Kenya Young Doctor Caucus and selected medical schools. A total of 358 respondents fully completed the survey and were included for analysis.

2.7. Meta-ethnography review of internship experience and career intention

I aimed to understand how the critical period of internship training shapes junior doctors' career decision-making. The findings can inform medical regulators and educators, hospital administrators, and policymakers on factors to consider in strengthening internship training and career advice, especially when trying to attract junior doctors to less popular specialties and work locations.

I conducted qualitative evidence synthesis using *meta-ethnography*. There are different methods for qualitative evidence synthesis. I chose meta-ethnography, a theory-generating, interpretive methodology for qualitative evidence synthesis as I hoped to develop conceptual understanding, through a process of constant comparison of concepts and metaphors, rather than simply aggregate findings (119,120). I followed the 7-stage approach developed by Noblit and Hare for the synthesis process (119). I searched six electronic bibliographic databases for papers published between 2000-2020

and included papers exploring how foundation years or internship experiences shape doctors' career intention/decisions, including in relation to migration, public/private/dual practice preference, rural/urban preference, and specialty choice. Papers were screened, "translated" and data synthesised. I used the GRADE-CERQual framework to rate confidence in review findings (121), and also developed a conceptual model to illustrate the journey of career intention/decision-making during this period. The conceptual model was further tested out in the Kenyan population using data collected from the semi-structured interviews described below.

2.8. Semi-structured interviews with junior medical officers and consultants in Kenya to understand internship experience and career transition

This ***qualitative work using semi-structured interviews*** with junior MOs and consultants in Kenya aimed to understand their internship training context, experiences as well as further career planning and transition. I included both MOs and consultants, i.e. interns' supervisors, to examine these issues from different perspectives, especially as consultants could also provide us with data on interns' preparedness and competence as well as how things have changed over the past cohorts of interns. Due to Covid-19 and travel restriction, I worked closely with an Assistant Research Officer from KWTRP, Daniel Mbutia (DM), during the data collection and analysis phases. DM has a background in public health and experience with qualitative research. Additionally I have provided training and guidance to him throughout the process.

Interviewees were sampled using a snowballing approach where DM and I identified several MOs and consultants through our personal network, and then asked them to

further introduce us to more eligible participants. From June to Sept 2021, we recruited a mix of MOs who interned in different hospitals and currently working in different occupations, and a mix of consultants from different specialties to ensure the diversity of the sample and information richness. Data saturation was reached in many areas after 20-25 interviews with MOs and interviews with 10 consultants. It became challenging to recruit MO respondents that were not working clinically as these are relatively few (e.g. those working in business or as researchers), therefore we concluded our data collection with 30 MO interviews and 10 consultants (Table 7).

Table 7. Characteristics of semi-structured interviewee

30 junior medical officers who finished internship within 3 years	
Undergraduate training	29 public, 1 private
Internship hospital type	25 public, 3 mission, 1 private, 1 military
Internship hospital level	14 level 5, 16 level 4
Current occupation	26 MO, 2 researcher, 1 resident, 1 in business
10 consultants with experience supervising interns	
Internship hospital type	8 public, 1 mission, 1 private
Internship hospital level	3 level 6, 4 level 5, 3 level 4
Specialty	2 surgery, 2 int med, 5 paediatric, 1 OBGYN

A semi-structured interview guide (see Appendix 6) was developed, informed by the scoping review themes but we also added questions on the broad context of internship, how MOs make their career decision post-internship and specifically how MOs were being recruited into their current job. For consultants we also asked them about their perception of interns' preparedness and competence. Interviews lasted 30-60 minutes and were conducted in English. They were mostly online but sometimes in person between June and Sept 2021. DM led most interviews, and I sat in all interviews to listen and ask follow-up questions. After each interview, we reconnected to monitor progress,

discuss preliminary findings, and whether we reached saturation. Detail on data management and analysis is provided in Section 2.10.

Data collected with MOs and consultants were analysed for three different purposes:

- To understand the internship training experiences and context, as part of the mixed-methods study on Kenya's internship experiences, presented in Section 4B;
- To examine how internship experience influences medical interns' career intentions, especially validating the meta-ethnography produced framework, presented in Section 5B;
- To investigate how MOs are absorbed into the public sector post-internship alongside interviews with county-level managers, the results are shown in Chapter 6.

2.9. Fieldwork and interviews within two Kenyan counties to understand absorption of medical officer into the public sector

Semi-structured individual or group interviews with county-level and subcounty-level managers were conducted in two selected Kenyan counties between Sept 2021 and March 2022. I designed and led this piece of work which was embedded as part of a larger set of work examining counties' HRH management capacity and relevant interventions led by Dr. Jacinta Nzinga (Health Policy and Systems Researcher from KWTRP) and Joshua Munywoki (JM, another Assistant Research Officer from KWTRP).

Two counties were purposefully selected by the research team jointly, with consideration of geographic locations, HRH density and expenditure as well as practicality for fieldwork.

The two counties selected vary in the percentage of the county's total budget allocated to health (around 35% and 20% respectively, as compared with the national average of 28%), and different levels of workforce (county A has nearly double the size of the workforce when compared to county B despite a similar level of population) (See Table 8).

Table 8. Attributes of two counties examined

Attribute	County A	County B
Population (2019)	Around 1 million 121 people/km ²	Around 1 million 65 people/km ²
Main economic activities (from counties' factsheet)	• Domestic/subsistence farming • Small scale farming e.g., bee keeping, dairy farming, fruits	• Commercial farming e.g., wheat, maize, potatoes • Tourism • Livestock farming
Diseases with high prevalence (from counties' factsheet)	• HIV/AIDS • Malaria (low risk) • Respiratory infections	• HIV/AIDS • Malaria (highland epidemic prone) • Trypanosomiasis • Foot and mouth disease
% county budget allocated to health sector (2019/2020)	~35%	~20%
Health workforce (2020)	~80 medical officers, 750 nursing staff	~40 medical officers, 450 nursing staff
% county health budget allocated to health workforce (2019/2020)	~60%	~45%
% county budget allocated to health workforce (2019/2020)	~20%	~10%

Note: Data are approximation for anonymisation purposes. Source: (97,122)

JM led all the work in county A while I joined a few of the interviews online, and I joined JM for fieldwork in county B for two weeks. In each county, we identified potential managers purposefully covering different county departments and sub-counties, and

asked the county Chief Executive Committee (CEC) member for health and Chief Officer for Health to authorise and introduce us to those potential interviewees. A total of 51 county-level and subcounty-level managers were interviewed either individually or in groups (e.g. we interviewed the county and subcounty health management team members together). Respondents were affiliated with the county health department (n=11), public service board (n=2), subcounty health department (n=17), public facilities (19) and other departments (n=2). We concluded our data collection after these two counties due to fieldwork timing constraints, additional interviews with public service board managers in different counties could have added richness to our data.

A semi-structured interview guide (see Appendix 5) was developed focusing on various aspects of HRH management capacity and intervention, and more specifically for recruitment we asked counties their experiences and processes of recruiting and deployment, where possible contrasting recruiting MOs versus other cadres such as nurses and clinical officers. Interviews lasted 20-90 minutes and were conducted in English. JM and I took turns leading the interviews and we discussed key takeaways and progress after each interview. Data analysed using this data is presented in Chapter 6.

2.10. Data management and analysis

Literature-based review data

For literature-based review data, citations were imported into Abstrackr for initial title and abstract screening (123), and Microsoft Excel for full-text screening. I used Gwet's AC1 to assess agreement rate between reviewers, which is an agreement coefficient that performs better than Cohen's Kappa when prevalence is low (124,125). Additionally, I

resolved disagreements on inclusion at title and abstract stage or at full-text stage through discussion among the reviewers.

I used Microsoft Excel spreadsheets and Word documents for data extraction and analysis stages. For the meta-ethnography review, I also used NVivo software (version 1.4) to facilitate close reading and data extraction from publications. The analysis followed review-specific guidelines and purposes, such as the five steps of Arksey and O'Malley method for scoping review (114) and the 7-stage approach developed by Noblit and Hare for the meta-ethnography process (119).

Quantitative survey data and secondary data

For the scale development and validation as well as survey work in Kenya, a database capturing data from self-administered questionnaires was developed in Research Electronic Data Capture (REDCap) in collaboration with the KEMRI-Wellcome Trust Nairobi data team. The online questionnaires were directly captured in REDCap. Respondents' willingness to complete and submit the questionnaire, which included the study information and consent explanation sheet, was taken as indicative of consent. Data from these questionnaires was collated on a central server maintained by KWTRP after being de-identified and encrypted for transmission over the internet. Data was also saved on an Oxford University-certified OneDrive securely encrypted and access controlled by password, accessible from my laptop. Data collected from other study-countries were captured in REDCap, Microsoft Forms and Wenjuanxing (a survey tool commonly used in China) hosted by corresponding countries' collaborators and shared with me after being de-identified and encrypted for transmission over the internet.

As for the secondary data from KHFA, the de-identified data shared with KWTRP was stored in secure servers with password protected access and as guided by KWTRP Information and Communications Technology and Data Management policies. Data was also saved on an Oxford University-certified OneDrive securely encrypted with access controlled by password, accessible from my laptop.

Quantitative data were managed and analysed using STATA (Stata V.17). Descriptive statistics on frequencies, percentages and means were used to describe the capacity of internship training hospitals as well as the internship experience of MOs. Other analyses such as exploratory and confirmatory factor analysis were conducted for scale development and validation, which is explained in Section 4C.

Qualitative interview and discussion data

All interviews were audio-recorded and transcribed verbatim by an external provider. Recording files were kept on an Oxford University-certified OneDrive securely encrypted and access controlled by password, accessible from my laptop. I checked all transcripts for accuracy and completeness, all data were de-identified by removing all personal identifiers using a consistent anonymised labeling system (see Box 1 for the labelling of respondents). A separate list of the interviewees' characteristics and demographic details, was kept in a word document, in line with KWTRP data governance policies.

Transcribed interviews were transferred to Nvivo software (version 1.4). The software provides an effective way of storing and organising the data so that they are accessible

for the analysis process. I first read the transcripts alongside the audio-recordings to familiarise myself with the data. I used a thematic analysis approach (126) or direct content approach (127) to analyse the qualitative data as appropriate. For thematic analysis, codes were developed deductively and inductively based on the respective frameworks, and core thematic areas and sub-themes were further refined and summarised as I familiarised myself with the data. As new sub-themes emerged from the coding analysis that did not fit in any prior theme, I listed them separately. For the direct content approach which is used for testing out the conceptual framework developed from the meta-ethnography, I coded the data first deductively and where new codes emerged that did not fit in the original model, I amended the original categories inductively. Preliminary findings were presented to the other data collectors as well as all other investigators who were not directly involved in coding to triangulate and increase the trustworthiness of the findings.

Box 1. Labelling of interview respondents

I use the following labelling approach to indicate the sources of qualitative quotes from interviews and discussions in this thesis:

1. For medical officer respondents:
Respondent No. – Level of internship facility + facility ownership - Current job
For example, “Medical officer, M01 – L5 Public - Research” refers to medical officer 01 who interned in a level 5 public hospital and currently working in research.
2. For consultant respondents:
Respondent No. – Level of current facility + facility ownership – Specialty
For example, “Consultant, C01 – L5 Private – Internal medicine” refers to consultant 01 who works as an internal medicine consultant in a level 5 private hospital.
3. For county-level managers:
County A/B, Respondent No.
For example, “County A, A1” refers to respondent 01 from County A and “County B, B01-05” refers to a group interview with respondents 01-05 from County B.

2.11. Ethics approval and research permits

For the empirical survey and qualitative work, the ethical approvals and permits for this study are issued by Oxford Tropical Research Ethics Committee (OxTREC 563-20 and OxTREC 518-21), Kenya Medical Research Institute (KEMRI) (SERU 4071) and Kenya National Commission for Science, Technology and Innovation (NACOSTI/P/20/7141, NACOSTI/P/22/14714). Oxford and KEMRI approvals are provided in Appendix 1. As for the MIES scale development and validation work, additional ethics approvals are secured from Makerere University School of Public Health, Research Ethics Committee and the Uganda National Council for Science and Technology in Uganda (PI: Dr. Raymond Tweheyo SPH-2021-168 and HS2062ES), University of Burundi (PI: Dr. Nadine Misago

05/05/2021), Jos University Teaching Hospital in Nigeria (PI: Dr. Kevin Kwarshak JUTH/DOS/REC/127/2693), Sierra Leone Ethics and Scientific Review Committee (PI: Dr. Sulaiman Jalloh), Tsinghua University in China (PI: Dr. Kun Tang No. 20220063), University of Medicine and Pharmacy at Ho Chi Minh City in Vietnam (PI: Dr. Lam Phung Khanh No. 708), Fiji National University (PI: Dr. Sefanaia Qaloewai). Electronic consents or written consents were obtained for all survey participants, and written consent as well as verbal informed consent were obtained for qualitative research participants.

Additionally, written permissions were secured for my use and adaptation of each questionnaire tool in the MIES scale development and validation work, including Dr. Suanne Roff from University of Dundee for Postgraduate Hospital Educational Environmental Measure (PHEEM), the Centre for Victims of Torture for Professional Quality of Life Scale (ProQOL), Dr. Sheldon Cohen from Carnegie Mellon University for Perceived Stress Scale (PSS), Dr. Eric Thomas from University of Texas Health Science Center for Safety Attitude Questionnaire (SAQ) and open use statement for Patient Health Questionnaire-9 (PHQ-9).

The Kenya MOH Division of Monitoring and Evaluation, sought approval for, planned and executed the 2018 KHFA. Written informed consent was sought by in-charges or acting in-charges of all the facilities surveyed. Permission from the Kenya MOH Division of Monitoring and Evaluation was then granted to use these data for the secondary analysis to improve the quality of health service provision in Kenya.

2.12. Reflexivity

Reflexivity is “a continuous process of reflection by researchers on their values and of recognising, examining, and understanding how their social backgrounds, locations and assumptions affect their research practice” (128). For health systems research, it is important to discuss and reflect on how the researcher’s own position and value shape the data collection and influence the interpretation process (129).

I am a Chinese man with a master’s in public health and past research experiences on HRH and health systems in China and Myanmar. However, I am not Kenyan, and prior to my DPhil I have never worked in Kenya or other African countries. Additionally, I am also not a medical doctor myself, therefore I am very much an “outsider” in this research context, aside from getting a “visiting scientist” badge from KWTRP while I was in Kenya. Luckily, this DPhil work is framed within a larger set of research led by Dr. Jacinta Nzinga on examining human resources for health in Kenya. I have led my own work but been part of this team, and I have been very fortunate to work closely with two assistant research officers Daniel Mbuthia (DM) and Joshua Munywoki (JM), two Kenyan men with public health training and research experience in Kenya’s health systems; as well as many other researchers that are “insiders” to the Kenyan health system context.

For data collection, semi-structured interviews with MOs and consultants were largely conducted by DM and I sat in all the interviews online, due to Covid-19 and travel restrictions. While the majority of interviews were conducted in English, the participants occasionally spoke Swahili and I had to rely on DM to interpret afterwards. I being an “outsider” allowed or forced the participants to fully explain the Kenyan training and

political context. However sometimes I did not understand the context clearly, and I had to discuss and clarify with DM after the interview.

As for the fieldwork in two counties in Kenya, I was part of one fieldwork activity together with JM. Being an “outsider” in one county fortunately gave us easier access, as the county stakeholders knew that I needed to leave the country soon so they tried to avoid keeping us waiting. My sense from interviewing the county-level managers was that some saw me as a safe impartial “outsider” so that they could be open, while a few others such as the non-health managers were cautious in how much should be disclosed – especially as JM was not originally from that county and one department specifically asked “which county are you from?”. Additionally, our affiliation with KEMRI and Oxford was shared with the participants prior to each interview, which added trustworthiness for the county-level managers, who believed that we would be able to debrief with national-level stakeholders and even provide funding to the county. This allowed them to be more open about the challenges they faced.

After each interview, DM, JM and I debriefed and discussed our perspectives and also how our past experiences with the county, personal interaction with the participants as well as our previous background may influence our interpretation.

While the analysis for the study was performed by myself, throughout the process I discussed with DM, JM and my supervisors who are familiar with the Kenyan health system context to ensure that my interpretation was a credible reflection of the data and makes sense in the current context. I also presented my findings on various occasions

including at KWTRP internal seminars, a Kenya Medical Association preconference, and to various national-level stakeholders such as medical school deans and KMPDC stakeholders, to “validate” my findings and ensure my “outsider’s” interpretation speaks to “insiders’” observation.

2.13. Covid-19’s impact

Research activities for this thesis were impacted by Covid-19 in two ways. To start with, data collection and fieldwork activities were significantly disrupted by Covid-19 and corresponding travel restrictions. I had originally planned to visit Kenya and collect all the data myself starting in August 2020, including distributing the survey through a paper-based questionnaire and conducting qualitative interviews face-to-face. However due to Covid-19, travel to Kenya was restricted and non-Covid-19 field research was not allowed by KEMRI for the majority of 2020 and early 2021. Therefore, I changed all data collection activities to online-based approaches whenever possible, and worked closely with two assistant research officers DM and JM for data collection. Nonetheless, such changes might have impacted the quality of data being collected, for example changes in response and completion rate for questionnaire surveys (130) and loss of visual cues and non-verbal data in semi-structured interviews (131).

Additionally, Covid-19 has inevitably affected the internship training experiences and labour market dynamic in Kenya. Although data elsewhere suggested that inpatient admission actually decreased during Covid-19 (132), the studied cohort of interns may have experienced a higher level of stress and workload working in Covid-19 contexts. There was also another national health worker strike demanding better working

conditions such as provision of personal protective equipment and enhanced risk allowance from Dec 2020 to Jan 2021 and subsequently smaller one-week strikes in selected hospitals (133). All these could influence their internship experience and career decision-making. Covid-19 also impacted government's planning for the workforce including an emergency hiring scheme (Table 6). Therefore, the potential impact of the pandemic will be taken into consideration while interpreting the results.

The following chapters present the major findings. In Chapter 3, I characterised the internship training context and hospital capacity in Kenya; in Chapter 4, I described the internship training experiences for Kenyan MOs and developed a tool to measure internship experiences for LMICs; in Chapter 5, I examined how internship training experiences influence doctors' future career intentions and decisions in Kenya and other countries; and in Chapter 6, I investigated the absorption of MOs into Kenya's public sector at county-level after internship; and finally in Chapter 7, I triangulated and summarised my findings.

Chapter 3. Assessing the training environment in Kenyan internship hospitals

This section includes content from Zhao Y, Osano B, Were F, Kiarie H, Nicodemo C, Gathara D, English M. *Characterising Kenyan hospitals' suitability for medical officer internship training: a secondary data analysis of a cross-sectional study. BMJ open. 2022 May 1;12(5):e056426.*

As highlighted in the introduction chapter, medical schools in Kenya are expanding to meet HRH gaps, and the number of internship training centres providing internship training also expanded dramatically to allow the increasing number of medical graduates to take on internship positions. The educational and work environment of these hospitals could directly impact doctors' internship experiences. Therefore, it seems important to understand and assess the context of internship training specifically whether these hospitals have the capacity of providing internship training, which is the focus of this chapter.

3.1. Background

In Kenya as in many countries, doctors are first trained for 6 years in medical school (typically 3 years pre-clinical, 3 years clinical). This is followed by a mandatory one-year internship prior to receiving a license to practice from the national regulatory board, i.e. the KMPDC, overseen by the National MOH (88). The Kenyan medical internship includes supervised rotation in 4 major departments (surgery, internal medicine, paediatrics and

child health, and OBGYN in one Internship training centre; but since 2020 mental health and community health practice became added requirements). The competencies medical interns are expected to develop e.g. compulsory procedures that should be carried out either independently or under supervision, are outlined in national guidelines and in greater detail in interns' personal log books (87). After successfully completing internship and subsequent licensure individuals can practice medicine unsupervised as general MOs in different types of facilities.

Medical internships are undertaken in specific hospitals approved for this purpose after evaluation by the KMPDC, and all hospitals should meet and maintain their minimum requirements. These sites are an essential component of the health and education system producing a country's future physicians (134). Ensuring internship training hospitals are well-staffed and equipped is important so that medical graduates can be supervised and supported to consolidate their knowledge and skills, including of common clinical procedures, and become competent medical doctors (135). Improving internship training could also improve the quality of care and patient safety as interns are at the frontline of patient management, especially in LMICs (136). More importantly, skills and practices learnt during internship are taken forward into independent clinical practice and training of the next cohort of interns and other health worker cadres (33). Therefore poor internship training has continuous and long-lasting effects on future practices.

As with other African countries, medical schools in Kenya are expanding to meet HRH gaps. The number of Kenyan medical schools has increased dramatically from 2 in 2004 to 11 in 2018 (89), meanwhile the number of medical doctors graduating almost doubled

from 287 in 2006 to 573 in 2018 (39,90). The number of internship training centres recognised by the MOH and regulators also increased from 6 to 74 over the past 15 years and includes private or mission/faith-based hospitals (21,91). Many new training centres that were formerly district hospitals but are now county hospitals in Kenya (at Level 4 of its 6-level health system, usually primary facilities) became recognised as internship centres alongside more established secondary or tertiary regional and national hospitals (at Level 5 and 6 respectively). However, these county hospitals may have shortages of staff, limited diagnostic facilities, and frequent stockout of medications and diagnostics reagents. Lack of organisational structures and resources, i.e. inadequate capacity, would mean these facilities are not ready and suitable for providing internship training, for example a qualitative study in Kenya suggested that these county hospitals are “not organised for training purposes” (21).

Previous studies conducted in Kenya between 2012 and 2014 highlighted poor working conditions and experiences for interns at district hospitals, however they were limited in scale (all including less than 10 hospitals) and did not compare hospitals at different levels and sizes (21,137,138). Using data collected from the KHFA 2018, I address the question “what capacity do facilities offering internship training have?” To do this I characterised the capacity of 61 internship hospitals, contrasting findings across levels of hospitals and with the minimum requirements outlined in the national guidelines for medical officer internship training (87), with a specific focus on the “structural” component of the Donabedian quality of care framework (structure, process and outcome) (139).

3.2. Methods

Data sources

This is a secondary data analysis using data from the 2018 KHFA. Details of the KHFA and its methodology are publicly available (113). KHFA used the Kenya Health Master Facility List (MFL) as the sampling frame. It randomly sampled 2,980 out of 10,535 health facilities in Kenya, but purposely included all secondary hospitals, public primary hospitals and maternity and nursing homes. Sixty-one out of seventy-four internship training centres were sampled in KHFA. The survey included over 3000 questions covering five main modules on resource availability, management and finance, readiness, quality and safety of health care, and data verification (information systems). Data were collected through facility audit, observation and validation, provider interview and record review. To supplement the KHFA data I extracted: the inpatient bed number in 2020 from the MFL (69); the total delivery count between 2018 to 2020 from the national Kenya Health Information System (previously District Health Information Software-2 [DHIS2]); and verified key HRH data for six hospitals with incomplete information through direct contact with hospitals.

Domains and indicators

I focused on the “structure” component of the Donabedian quality of care framework to characterise hospitals. Specifically, I explored staffing, equipment and service availability and whether they fulfil the minimum requirement outlined in the Kenyan National Guidelines for Internship Training of Medical and Dental Officer Interns (2019) and the National Guidelines and Log Book for Medical Officer Interns (2019) (87). For example, the guidelines require that each internship training centre: i) has a minimum of 5 medical

specialists, covering paediatrics & child health, general surgery, internal medicine, OBGYN and family medicine, ii) is fully operational on a 24-hour basis including accident & emergency, diagnostic and pharmacy services, iii) enables interns to observe and/or perform certain procedures to fulfill competency for each specialty. Examples of the latter in surgery include a total of 36 competency procedures such as appendicectomy or repair of inguinal hernias. This requires that these services be provided by internship training centres (87).

Together with my primary supervisor Mike English, I initially filtered out 277 indicators from the 3000 questions from KHFA to identify those most relevant to the minimum criteria defined by the national internship guidelines. Two other collaborators, Boniface Osano and Fred Were, who are medical school faculty and who supervise MO interns subsequently reviewed these indicators identifying those felt to be most useful to characterise hospitals as contexts for internship training. A final list of 166 indicators was agreed by all four of us and selected for further analysis as “signal indicators” of the minimum requirements for internship training centres. All the indicators were converted into binary responses with 1 representing “met/available” and 0 representing “not met/unavailable”. I grouped indicators into 12 logical domains described in brief in Table 9 with further detail of all indicators available in Appendix 7.

Table 9. Domain and indicators selected for the Kenyan internship centre capacity analysis

Category	Domain	Number of indicators	Example indicators	Indicator and domain conversion
Human resources	(a) Human resource for health	6	Total staff assigned, employed, seconded (including part time) – Paediatricians, Neonatologists	All the indicators were converted into binary responses with 1 representing “available” and 0 representing “unavailable”. For most indicators on availability, I defined available as “onsite, observed, non-expired and functional”. For tests that are reported to be available offsite, or tests that are observed but expired, and for equipment reported available but not observed, or not available now, I labeled them as “unavailable”. I also considered an indicator to be unavailable if the health facility did not answer this question, usually because its filter questions were answered no.
Diagnostics and supportive care	(b) Laboratory (including 4 sub-domains, rapid test, basic lab test, infectious diseases test, advanced lab test)	31	TB test availability - Xpert MTB/RIF rapid diagnostic testing for tuberculosis	
	(c) Oxygen	10	Please tell me if the pulse oximeter are available anywhere in the outpatient service area and are functional.	
	(d) General equipment	8	Electrocardiogram (ECG) Equipment available and functioning today	
Service continuity and safety	(e) 24/7 availability	8	Is emergency medicine specialist or general medical practitioners always available 24-hours for emergency service, either onsite in emergency unit or not onsite in emergency unit but on-call inside facility?	
	(f) Infectious prevention and control	9	Does this facility have guidelines or protocols for cleaning the facility such as the floors, counters, and beds?	
	(g) Quality and safety	24	How frequently does the quality assurance committee meet? - Monthly	
Major specialties	(h) Surgery (including 2 sub-domains, equipment/medicine and service)	20	Functioning of basic surgical equipment - EKG electrodes	
	(i) Internal medicine (including 2 sub-domains, equipment/medicine and service)	12	Do providers in this facility diagnose and/or manage diabetic patients?	
	(j) Paediatrics (including 2 sub-domains, equipment/medicine and service)	20	Is KMC (Kangaroo mother care) for premature/very low birth-weight babies) used in this facility?	
	(k) Obstetrics-gynaecology (including 2 sub-domains, equipment/medicine and service)	11	Parenteral administration of antibiotics (IV or IM) for mothers carried out	
	(l) Mental health/neurology	6	Does this facility offer any services for mental and/or neurological conditions?	

Note: Full list of indicators is available in Appendix 7.

Analysis

For each domain, I calculated a score as a percentage based on the number of indicators with a score of 1 (met/available) divided by the total number of indicators (those met/available + those not met/unavailable). I generated an overall capacity index as the unweighted mean of all 12 domain scores for each facility. I stratified the 61 included internship training centres into three categories based on hospital administrative level and inpatient bed number. Kenya has a six service-level system based on the essential package for health, this includes at Level 4 primary facilities including district hospitals, Level 5 secondary provincial hospitals and Level 6 tertiary and national hospitals. I first grouped all internship hospitals that are Level 5 & 6 together (bed number 174-1455, n=15) as historically they have been better resourced; for the internship hospitals that are level 4, I divided them based on bed number into: Level 4 small hospitals (bed number 82-175, n=23) and Level 4 large hospitals (bed number 176-320, n=23). Data analysis was conducted using STATA V.17 (Stata Corporation, Texas, USA).

Ethics approval

Information provided in Section 2.11.

3.3. Results

Sixty one out of seventy four (61/74) internship training centres are sampled in KHFA and are mostly public hospitals owned by the MOH (n=54). The 13/74 hospitals not sampled due to random sampling and other authorisation reasons are either private hospitals (n=4), faith-based or mission hospitals (n=8) or a military hospital (n=1). Comparing hospital characteristics retrieved from DHIS2 and MFL between the 61 KHFA-sampled

hospitals with 12 of the 13 non-sampled hospitals (the military hospital did not report to DHIS2 or MFL), the 61 KHFA hospitals are slightly larger in terms of hospital beds (median and inter-quarter range [IQR] 200 [156, 276] vs. 180 [106, 221]), and report conducting three times as many deliveries (median annual deliveries 3981 vs. 1150) and twice as many Caesarean sections (median 987 vs. 537 per year). Detailed characteristics comparing the 61 KHFA internship training centres and these 12 others are presented in Appendix 8.

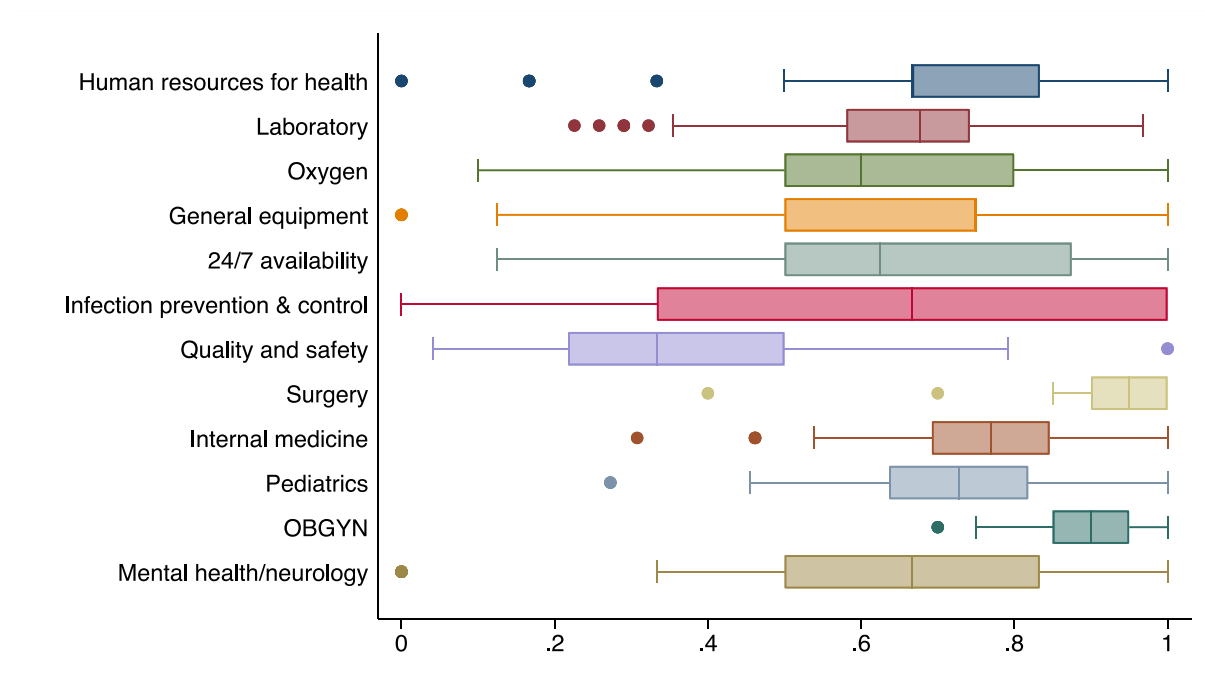


Figure 7. Distribution of capacity score by domain

Overall capacity

The distribution of capacity score by domain is presented in Figure 7 and Table 10.

Ideally, an internship centre should score 100% against the (minimum) signal indicators but the overall capacity index is 69% (95% CI 66% - 72%) for all internship training centres, and 63%, 67% and 81% for Level 4 small, Level 4 large and Level 5 & 6 hospitals

respectively. Hospitals had moderate capacity for most of the general domains other than quality and safety. Surgery and OBGYN had higher scores regardless of hospital size, level and location, suggesting that the capacity for these two specialties is better across all facilities. Level 5 & 6 facilities had higher capacity scores in all domains when compared with Level 4 hospitals.

Table 10. Capacity scores by hospital characteristics

	Level 4 small hospitals (n=23)	Level 4 large hospitals (n=23)	Level 5 & 6 hospitals (n=15)	Total (n=61)
Total capacity index	63%	67%	81%	69%
Human resources for health	64%	67%	89%	71%
Lab test	60%	63%	77%	65%
Oxygen & respiratory support	64%	57%	77%	64%
General equipment	53%	59%	72%	60%
24/7	58%	65%	68%	63%
Quality and safety	35%	38%	50%	40%
Infection prevention & control	57%	58%	92%	66%
Surgery	94%	89%	97%	93%
Internal medicine	70%	73%	90%	76%
Paediatrics	67%	70%	81%	72%
OBGYN	89%	91%	91%	90%
Mental health/Neurology	44%	73%	83%	64%

Note: The colours in the figure reflect the relative values of capacity scores, the darkest green represents the highest values in the table, while the darkest red represents the lowest values.

Human resources

The 61 internship training hospitals had a median of 14 post-licensure MOs, 4 medical specialists, 25 clinical officers, 210 nurses and midwives, 14 medical laboratory technologists, 5 radiographers and 14 allied health professionals. Differences between

small and large Level 4 hospitals were small for most cadres, whereas Level 5 & 6 hospitals had, on average, double the numbers of specialists, nurses and midwives (Table 11). The national guideline specifically requires at least 5 medical specialists to act as the main clinical teachers and supervisors for medical officer interns, covering paediatrics & child health, general surgery, internal medicine, OBGYN and family medicine. However, only 29 out of 61 internship training centres had at least five medical specialists assigned, employed or seconded (including part-time staff), regardless of the specialty areas. Most hospitals had at least one surgeon (n=59/61), one paediatrician (n=52/61) and one obstetrician-gynaecologist (n=56/61), whereas only 35/61 hospitals had at least one internal medicine specialist. Although not a requirement from the regulator, only 30/61 hospitals had a physician anaesthesiologist (Figure 8) with anaesthesia mostly provided by clinical officers (51/61 hospitals have at least one anaesthetist COs). The 4 well-established university tertiary hospitals had better human resources and all but one fulfilled all the requirements.

Table 11. Human resources for health cadres by hospital characteristics

	Level 4 small hospitals (n=23)	Level 4 large hospitals (n=23)	Level 5 & 6 hospitals (n=15)	Total (n=61)
Medical officer	12 (6, 18)	14 (10, 20)	29 (21, 58)	14 (10, 26)
Medical specialist	2 (1, 7)	4 (1, 11)	16 (2, 26)	4 (1, 11)
Clinical officer	20 (13, 26)	25 (15, 33)	35 (21, 44)	25 (15, 33)
Nurse and midwife	206 (95, 248)	150 (113, 210)	336 (267, 534)	210 (114, 323)
Medical laboratory technologist	13 (11, 14)	14 (11, 18)	23 (19, 46)	14 (12, 20)
Radiographer	4 (3, 5)	4 (2, 6)	9 (6, 22)	5 (3, 7)
Allied health professional	11 (3, 14)	14 (10, 17)	29 (24, 44)	14 (6, 24)

Note: Data are presented as median (interquartile range), allied health professional refers to physical therapist, occupational therapist, orthopedic technician, plaster technician, nutritionists and dieticians. For medical officers this refers to qualified medical officer and in theory does not include interns.

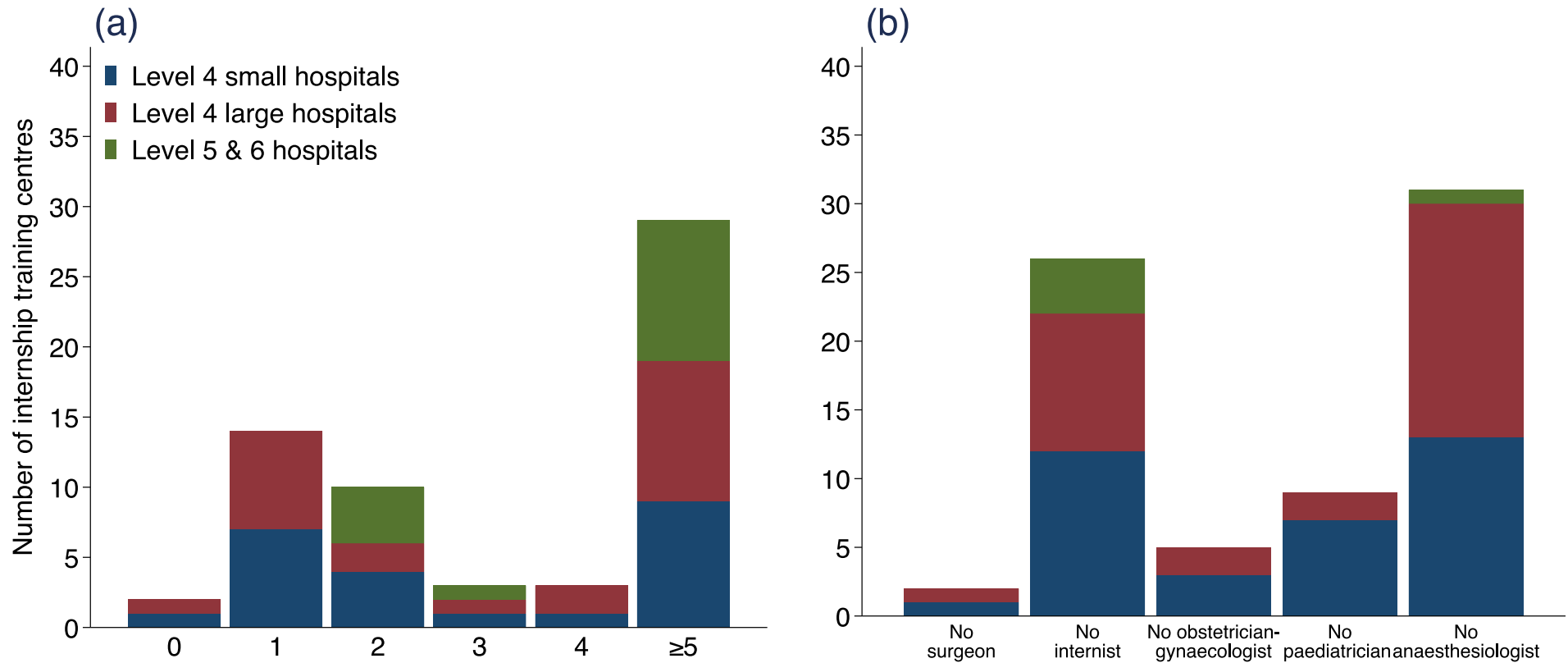


Figure 8. Number of internship training centres with different numbers of specialists (a) and with no surgeon, internists, obstetrician-gynaecologist, paediatrician and anaesthesiologist (b)

Note: I have combined different types of surgeons (general surgeons, paediatric surgeons, orthopaedic surgeons, cardiothoracic surgeon, ENT surgeons, plastic surgeons, neuro-surgeons, urological surgeons) into “surgeon” category. Similarly, specialist physicians (internists), oncologist, neurologist, cardiologist, critical care, gastroenterologist, palliative care specialist, nephrologists, rheumatologist, medical endocrinologist into “internist” category, and paediatricians and neonatologists into “paediatrician” category.

Diagnostics and supportive care

As for laboratory tests, internship training centres overall had moderate availability (over 60%) for rapid tests and basic laboratory lab tests (Figure 9 and Appendix 9), although ability to offer urine dipstick testing was present in fewer than 50% hospitals (n=26/61). 54/61 hospitals had rapid HIV tests, 16 hospitals provided onsite polymerase chain reaction (PCR) testing for HIV but only 5 had onsite HIV viral load testing. An additional 19 hospitals relied on off-site PCR testing. Availability for advanced lab tests is poor across all hospitals, only 12/61 hospitals could read papanicolaou test (PAP smear) results and prepare and examine any tissues or samples for cancer diagnosis onsite. Level 5 and 6 hospitals on average had better availability of diagnostics than Level 4 hospitals, especially for infectious disease and advanced lab tests.

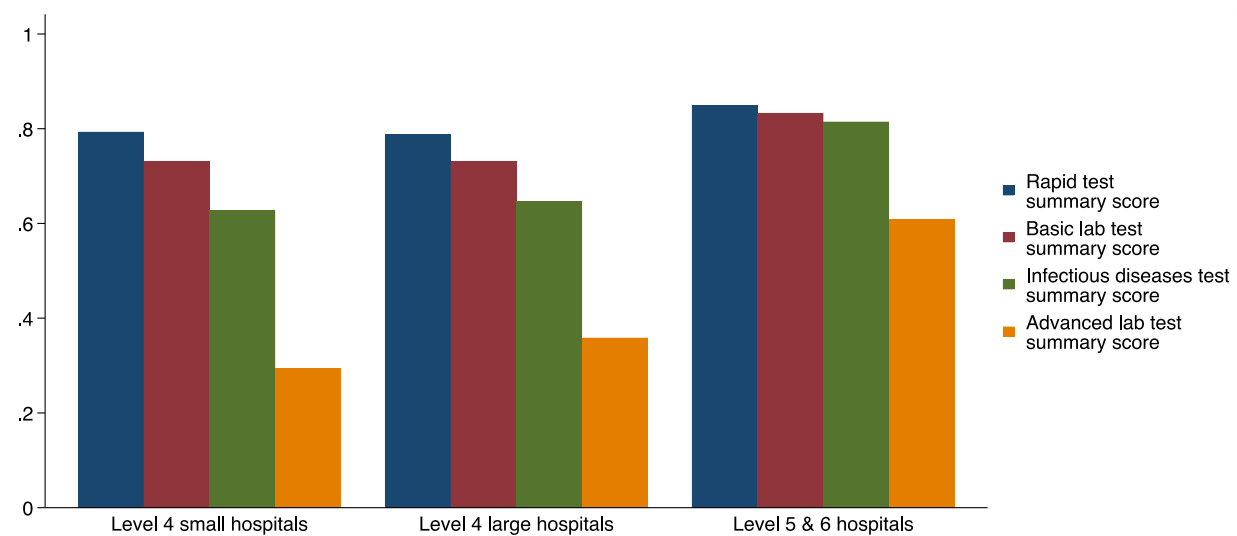


Figure 9. Average lab test score by sub-domain and hospital characteristics

Internship training hospitals varied when assessed for 10 oxygen and respiratory support indicators. While all hospitals were reported to have functional paediatric and neonatal oxygen, only 32 hospitals had ventilators available for adults and 13 hospitals had continuous positive airway pressure (CPAP) available for neonates (at the time of survey

in 2018 pre-Covid-19). Lastly for other general equipment, around 55/61 hospitals reported functioning ultrasound and X-ray services. In comparison, functional electrocardiogram (ECG) (27/61) and computerised tomography (CT) scan (21/61) availability was poor in most facilities.

Service continuity and safety

The national guideline requires that internship hospitals need to be fully operational on a 24-hour basis including accident & emergency, laboratory diagnostic services, and pharmacy which was investigated under “24/7 availability”. 48/61 hospitals reported having general medical officers or emergency medicine specialists onsite or on-call within facility. While emergency radiology, laboratory diagnostics (other than rapid test) and pharmacy services were available 24/7 in most facilities, only 13/61 hospitals reported availability of major emergency surgery and anesthesia 24/7, and only 16 hospitals provided 24-hour emergency services using a structured triage tool such as the WHO integrated triage tool.

The domain average score for infection prevention and control (IPC) is 66%. Most internship training centres had IPC guidelines and technical IPC committees, however, the actual procedures of cleaning beds, counters/tables, toilets were only done in around half of the hospitals on the day of KHFA survey observation. Twenty one input/structure indicators on quality and safety are also included in the current analysis. All but one indicator (death review results recorded) performed poorly across all facilities. Most facilities did not have observed guidelines for adverse event reporting, nosocomial infection reporting, surgical adverse event reporting or postoperative infection

definitions. Level 5 & 6 hospitals did not necessarily perform better than Level 4 hospitals in this domain.

Major specialties

For the four major specialties I used data on both specialty-specific equipment & medicines and specialty service areas (Appendix 7). For surgical and OBGYN scores, internship training centres in general had both functional equipment & available medicine (median 100% for surgery, 100% for OBGYN) and also good service availability for procedures relevant to the national guideline and log book (median 100% for surgery, 90% for OBGYN). The only indicator that had a lower score is cricothyroidotomy, where only 43/61 hospitals provided such service; and misoprostol tablet availability, where 44/61 hospitals had this medication available.

For internal medicine, availability of equipment and medicine is low (median 67%) with huge variation across facilities. 33/61 hospitals had a defibrillator, 39/61 had a renal dialysis/hemodialysis machine and 23/61 hospitals had lumbar puncture kits – for the rest of the hospitals they would need to improvise to perform lumbar punctures or cannot provide such a service. Service availability for internal medicine was good on average (median 90%), however availability for more advanced conditions e.g. colorectal cancer screening, diagnosis and/or treatment, and palliative care was limited, especially for Level 4 small hospitals. Similar with internal medicine, the availability of equipment for paediatrics was lower as compared with other specialties (median 63%). Only 19/61 hospitals had exchange blood transfusion capacity and similarly only 19/61 hospitals had

devices for intraosseous access. The three indicators of paediatric service availability (kangaroo mother care, sepsis, antibiotics regimen and follow-up) had good availability.

MO interns are also required to rotate in mental health for eight weeks during their one-year internship and are required to manage acute mental health emergencies and common mental health conditions. While 52/61 hospitals offered mental health and/or neurological services, only 17 hospitals had a physician psychiatrist. Sixteen hospitals had mental health inpatient wards, other hospitals either only provided outpatient services or lack these services. Only half of Level 4 small hospitals offered depression, psychosis and epilepsy diagnosis and follow-up services.

3.4. Summary and discussion

My analysis on the capacity of Kenya internship training hospitals suggested that in 2018 the overall staffing, equipment and service availability was inadequate when compared with the regulator's requirements. Level 4/district, smaller hospitals (23 of the 61 assessed) were more likely to have fewer human resources, equipment and specialty services, and less likely to meet quality and safety indicators. The implication is that hospitals with lower capacity may either have to improvise to offer core services or refer patients to other facilities. This could significantly influence the quality of training as interns might not be able to fully consolidate their knowledge and skills, but also will impact their competence moving forward.

Over half of the internship training hospitals did not have five or more specialists as required by the regulator, the KMPDC, which suggests inadequate training and

supervision of MO interns. Internal medicine specialists and anaesthesiologists were most often lacking suggesting that in many centres non-specialist but licensed general medical officers or specialist clinical officers fill these roles. Even in these larger Kenyan hospitals such personnel will also likely therefore be leading provision of care for severe Covid-19. Where MOs are themselves also scarce, MO interns may become the only “in-house” doctor on call and be forced to take on full responsibility for patient care potentially threatening patient safety if interns are forced to care for serious, acute medical and surgical conditions without appropriate supervision (21,29,140). The likely challenges to provision of high quality safe care are further suggested by poor scores of all but tertiary hospitals against organisational indicators of quality and safety practice. In fact guidelines or instruction for quality and safety were rarely present and there seemed very limited evidence that quality and safety indicators are monitored, reviewed, reported and acted upon. These findings are consistent with reports highlighting challenges with patient safety in LMIC hospitals (141).

Internship hospitals appear most able to provide appropriate essential resources and capacities in the major disciplines of surgery and OBGYN. Challenges were especially noted in the disciplines of internal medicine and paediatrics and neonatology. Many facilities lack ECG machines, CT scans, defibrillators, equipment used for peritoneal or hemo-dialysis, and lumbar puncture kits. More specific to neonatal and child health were lack of capacity in ability to provide exchange transfusion, neonatal CPAP and intraosseous access. Capacity to offer mental health and neurological care was especially low most particularly in Level 4 small hospitals, likely due to these only being listed as internship requirements in 2020, and that Kenya has a severe shortage of psychiatrists

and neurologists as well as psychiatric nurses (142). For facilities without capacity in the major disciplines now including mental health and neurology services it is likely that hospitals are forced to refer patients elsewhere or improvise approaches to care in order to serve patients. Interns' training experience is therefore likely to be very varied and more attention may therefore need to be paid to planning how interns can be provided with adequate training in all specialties if this is a key long-term aim.

Kenya has dramatically increased its medical training volume hoping to produce 9,000 new graduate medical physicians by 2030 to narrow its staffing gap (89). More hospitals especially at county-level (district hospitals) are accredited as internship training centres. These hospitals are usually smaller in size and more likely to be distant from the well-established university tertiary hospitals in major cities that scored much higher across domains in our analysis. Rural rotations and residencies have been recommended by the WHO to increase health worker retention (106). Students or interns in these settings may also be more likely to learn hands-on clinical procedures and be actively engaged in patient care (143) as opposed to tertiary hospitals where the presence of more specialists and general MOs may result in interns undertaking more administrative work. However, the prerequisite of good internship training is that the hospitals are adequately staffed and equipped and ready to deliver teaching and training. Our data suggested that this is not always the case, and that these hospitals sometimes even rely on interns as "free labour" and the only "in-house" doctors taking on unsupervised clinical work. These findings are also consistent with previous qualitative research suggesting that district hospitals provided limited learning opportunities and supervision with limited suitability as internship sites (21), which will be further explored in Section 4B.

The potential consequences of poor training and supervision during internship are therefore worth consideration. As well as failing to consolidate knowledge and skills in major specialties, interns may also develop burnout and stress-related psychological problems more rapidly (21). These stresses and being forced to take significant clinical responsibility in poorly-resourced hospitals may push MO interns to leave the profession or the public sector which is often most resource constrained as soon as they are licensed/registered (32). This will likely worsen the internal and external brain-drain undermining UHC and equity and limiting any benefits from public investment in medical education (32). This will be further explored in Chapter 5. Inadequate support and supervision also threatens patient safety by creating the conditions for significant medical errors to occur. Even in settings without a “blame culture” such errors can have profound effects on the health workers as well as the patients further exacerbating workers’ psychological distress (144,145). We must also remember that today’s MO interns will become tomorrow’s general MOs who are often then responsible for the training of the next cohorts of interns and other health worker cadres (33). Therefore, poor internship training for medical officers continuously compromises the quality of training and skills that are passed on to other doctors, nurses and clinical officers and this may be a particular challenge to patient safety and healthcare quality that rely so heavily on effectively functioning teams (146).

My analyses have policy implications for Kenya policy-makers. The regulator requires internship hospitals to maintain the minimum requirement of staff and be able to offer a core set of quality services with self-report against such requirements at least once a

quarter. Our data would suggest many internship hospitals in Kenya might not continuously achieve these minimum requirements. Should this prevent interns from being licensed or should interns be reallocated to centres meeting regulatory requirements? While more stringent and regular audit and re-accreditation of internship training centres might be conducted by the regulatory council to ensure that only the hospitals that meet the minimum requirements are allowed to receive and train interns, adequate mitigation measures need to be in place so that interns themselves are not disadvantaged further, for example, by rotating interns between different level hospitals with different level of resource availability. More widely, our findings point to the need to carefully consider the potential consequences of rapidly expanding medical training and of appropriate planning and financing for new internship centres, especially in rural areas.

Several limitations should be noted for the current analysis. To start with, my analysis was only limited to the 61 internship training hospitals sampled by KHFA, mostly public hospitals. A total of 13 hospitals were not sampled in KHFA and are either private hospitals or mission hospitals, therefore comparison by hospital ownership was not feasible. Second, aside from the KHFA's own limitation on data missing, I noted data inaccuracy and inconsistency in some KHFA data we retrieved. I made efforts to clean these data, especially on human resources through correspondence, though I was unable to validate all the numbers from the KHFA survey. Third, to assess the capacity of internship training hospitals we selected 166 signal indicators from the 3000 questions from KHFA survey. My criteria were to ensure that the indicators selected are the minimum requirement and should be achievable (i.e. should be "1" for all indicators). My

selection was guided by the national guidelines and agreed by myself and three other collaborators, whom have experience supervising interns. However, I acknowledge that this process is somewhat subjective. Fourth, I only focused on the structural and organisational features of internship training hospitals. I did not include indicators on process or outcome indicators e.g. training or patient outcomes due to limited data availability. Ideally these should be considered while evaluating internship training hospitals and other good quality data could be linked to understand for example whether these structural issues also lead to poor patient outcomes. Last, the KHFA data was collected in a snapshot in 2018 prior to Covid-19. The appointment and posting of specialists may fluctuate from time to time but Covid-19 specifically could have led to the government investing in hospital infrastructure, equipment and emergency hiring to improve their response capacity to Covid-19. Therefore it is possible that the capacity of Kenyan internship training centres has improved since 2018 (147). Despite these limitations the data do suggest important shortcomings in internship training centres in Kenya. I suggest other LMICs that are rapidly expanding their medical training should also evaluate their internship training sites to explore the generalisability of our findings.

In summary, I assessed the capacity of 61 Kenyan internship training hospitals using data from KHFA 2018. My results highlighted major gaps in staffing, equipment and service availability. More specifically, there are weaknesses in areas regarding organisational arrangements that support quality and safety. Smaller hospitals are more likely to have a lower capacity index. In the following chapters, I will explore what are the internship experiences of Kenyan doctors in these different types of hospitals (Chapter 4) and how these further impacted doctors' career preference (Chapter 5).

Chapter 4. Developing tools and examining internship experience

The previous chapter highlights that major gaps exist in staffing, equipment and service availability of Kenyan internship hospitals, especially Level 4 hospitals. This chapter further explores what are the internship training experiences of doctors in Kenya and how they differ between those in different level hospitals. I used a mix of quantitative questionnaire survey data and qualitative semi-structured interviews to examine internship experience, and also aimed to develop a tool that could be used to assess internship experiences for all LMIC settings as these countries usually do not have existing large-scale national trainee surveys.

In Section 4A, I aimed to review and map relevant existing quantitative tools from the global literature, which would inform the development of my Kenyan survey tool and the scale development. In Section 4B, I aimed to summarise the results of the Kenyan survey while triangulating this with parallel qualitative work interviewing MOs and consultants. In Section 4C, I aimed to develop and validate a “medical internship experience scale (MIES)” for LMICs with collaborators from nine countries using a mix of workshops, cognitive interviews and survey analysis. It should be noted that I present the results of the Kenyan internship experience study first (Section 4B) as I used a convergent mixed-methods approach, and both the data collection and analysis of survey and interview data were guided by the major themes identified in the scoping review. The analysis that informed development of MIES (Section 4C) was not particularly guided by any themes or

frameworks. Therefore, its resulting factors/constructs that emerged from the exploratory factor analysis did not guide my analysis in Section 4B.

Section 4A. Scoping review on tools for assessing internship experiences

This section includes content from Zhao Y, Musitia P, Boga M, Gathara D, Nicodemo C, English M. *Tools for measuring medical internship experience: a scoping review. Human resources for health. 2021 Dec;19(1):1-2.*

4A.1. Background

As highlighted in Chapter 1, the internship training period could be very stressful due to the rapid transition from supervised learning in medical schools to rapidly assume clinical responsibility under supervision, accompanied by long working hours, unsatisfactory pay, and an ongoing need for learning and assessment (22). Improving the internship experiences of doctors is important to ensure psychological health and wellbeing of doctors in training, but also key for these junior doctors' competence and future clinical practices.

Previous systematic reviews have summarised the tools for assessing clinical (148), procedural (149) and psychomotor skills (150) in medical trainees, there has been a lack of focus on understanding what standardised tools are available to measure the experience of internship training. Moreover, there isn't a common definition of key areas

to measure, and the questions in major national trainee surveys differ substantially in each country (151–153). This limits options for comparison between countries and across time to assess long-term trends or results of interventions/policy changes.

In this scoping review, I aimed to fill the literature gap by mapping the existing tools to measure medical internship experience, summarising the major areas assessed and highlighting the tools used in multiple studies or with psychometric properties assessed directly in the intern population under study. I included tools across the global literature and also compared the tools that are used in high-income settings and LMICs. This review may help medical educators, human resource managers and policy makers decide what are the major areas to consider for internship surveys and what are the most appropriate tools available for this purpose.

4A.2. Methods

I followed the five steps of Arksey and O'Malley method (114) for scoping review to identify the existing tools to measure medical internship experience. I conducted the review in accordance with PRISMA-ScR standards.

Identifying the initial research questions

To guide the search strategy and ensure that a broad range of literature was captured, my research question was: “What are the existing tools to measure experience of medical interns?”. I defined medical intern as a physician who has completed their primary academic qualification and within a period of time (usually 1-2 years) typically working in

accredited positions in hospital settings, to gain supervised experience (See Box 2). I adopted a wide definition of experience to generate “breadth of coverage” (114).

Box 2. Different terminology for intern and their case for inclusion

- **Intern** refers to doctor in training who completed their primary qualification training and spend usually one to two years working in accredited positions in hospital settings. This period is compulsory and may be regulated by the government and professional licensing board. This is the period before they are fully licensed and registered to practice medicine unsupervised. This is the most common term in most countries.
- **House officer**, specifically **pre-registration house officer**, refers to doctor in first year after qualification. This is an official grade term in the UK until 2005 when it was replaced by foundation doctor but is still in use in some other countries e.g. Nigeria.
- **Foundation doctor** refers to doctor undertaking the UK foundation programme, a two-year structured programme that bridge between medical school and specialty training. This replaced the house officer grade in 2005.
- **Resident** usually refers to qualified doctor undertaking graduate medical education to obtain a license for a chosen speciality. In the US the first year of residency is called internship. While there are different requirements in each state and medical program, licensing usually happen after residency. In our review I included studies examining residents if they are referring to pre-licensed residents and are not residents from one single specialty.

[Identifying relevant studies](#)

In consultation with an experienced librarian, I conducted a systematic search using MEDLINE, Embase, PsycINFO, Education Resource Information Centre and the Cochrane Library to obtain relevant articles. I included quantitative studies published between 2000-2019 in English only due to time and resource constraints. I combined keyword terms and phrases related to medical interns (intern, foundation doctor, house officer, resident), tools (survey, questionnaire, assessment, evaluation, scale, index, instrument) and experience (experience, environment, culture, supervision, climate, well-being). To reduce the number of studies to be screened, I also excluded keywords related to

qualitative studies, other health workforce cadres, and clinical skills (see Appendix 10 for the search strategy).

Study selection

I included studies if they (1) examined pre-licensed/registered medical interns (I hand-searched the study population in that country to ensure the study population are pre-licensed and pre-registered); (2) measured or evaluated the non-clinical aspects of the internship experience on an individual level; (3) used a questionnaire or tool (quantitative design); I excluded studies if they (1) examined undergraduate/graduate medical students undergoing clerkships, qualified doctors, specialists, consultants, residents on one single specialty, other health workers or a mix of different population; (2) only measured or evaluated the clinical skills (surgical/procedural skills) of medical interns; (3) used a qualitative approach including interviews and focus group discussions.

After deduplication, I imported the citations into Abstrackr for initial title and abstract screening (123). I reviewed all the titles and abstracts to assess eligibility for full-text review, and a random subset of 40% were reviewed by two other reviewers Peris Musitia (PM) and Mwanamvua Boga (MB) together. I used Gwet's AC1 to assess agreement rate between reviewers, which is an agreement coefficient that perform better than Cohen's Kappa when prevalence is low (124,125). The agreement rate on which study to include between myself and PM + MB for this subset was high (percent agreement 0.96 [excellent], Cohen's Kappa 0.47 [moderate], Gwet's AC1 0.96 [excellent]) therefore we proceeded with the full-text review. I reviewed all full texts as primary reviewer and either PM or MB acted as secondary reviewer to determine inclusion (percent agreement

0.81 [excellent], Cohen's Kappa 0.60 [substantial], Gwet's AC1 0.65 [substantial]). I resolved disagreements on inclusion at title and abstract stage or at full-text stage by discussion among the three reviewers.

Data charting and collation

Three reviewers charted data from included articles and entered them into a Microsoft Excel spreadsheet. We extracted the following data items: title, authors, year of publication, country of study, study population category, internship training years, the number of hospitals included, sample size, data collection approach, questionnaire type, full questionnaire availability, any standardised scale or questionnaire used, key terms assessed, psychometric properties. We charted key terms by looking into the method, result, tables/figures, and questionnaire appendix when available, and summarising the key terms as they were defined or reported in their questionnaire or tool (e.g. burnout, depression, supervision, workload, work hours).

In the current review I am also interested in whether the studies reported evidence of internal validity and reliability in their study population. We extracted whether the study (1) provided actual evidence of internal validity (face, content, criterion, concurrent, convergent, discriminant, predictive, construct) and reliability (internal consistency, test-retest or inter-rater) tested within their study population (154), or (2) stated they were previously tested or verified but did not test in their study population, or (3) did not mention them.

Summarising and reporting findings

One aim of this review is to identify and summarise the major themes as a way of categorising the key areas covered by different studies and tools. Major themes assessed by the tools gradually emerged during title and abstract screening and were refined and finalised iteratively during full text screening and data charting and collation, developed by repeated discussions amongst the three reviewers (myself, PM and MB) and with my primary supervisor Mike English. We finalised with three major themes: well-being, educational environment, and work condition and environment.

I further combined and merged key terms extracted in the last step into sub-themes and placed them under each major theme. For example, under well-being we summarised sub-themes including stress, burnout; under work condition and environment, I merged work hours and workload as one sub-theme. I finalised and categorised the sub-themes and whereas there was uncertainty on the allocation of sub-themes, the uncertainties were resolved by discussions among the three reviewers.

I described the major themes and sub-themes assessed, and how many included studies examined each theme and sub-theme. For reporting of the actual tools, as the purpose of this study was to identify more widely-used tools and tools with better psychometric evidence, my reporting focused on the tools that were used in multiple studies, and tools with internal validity or reliability assessed directed in their intern population.

4A.3. Results

Search results

Figure 10 summarises the result of the review process. Of 7,027 citations identified after deduplication, 92 met inclusion criteria after the full-text review. The characteristics of included studies are provided in Appendix 11.

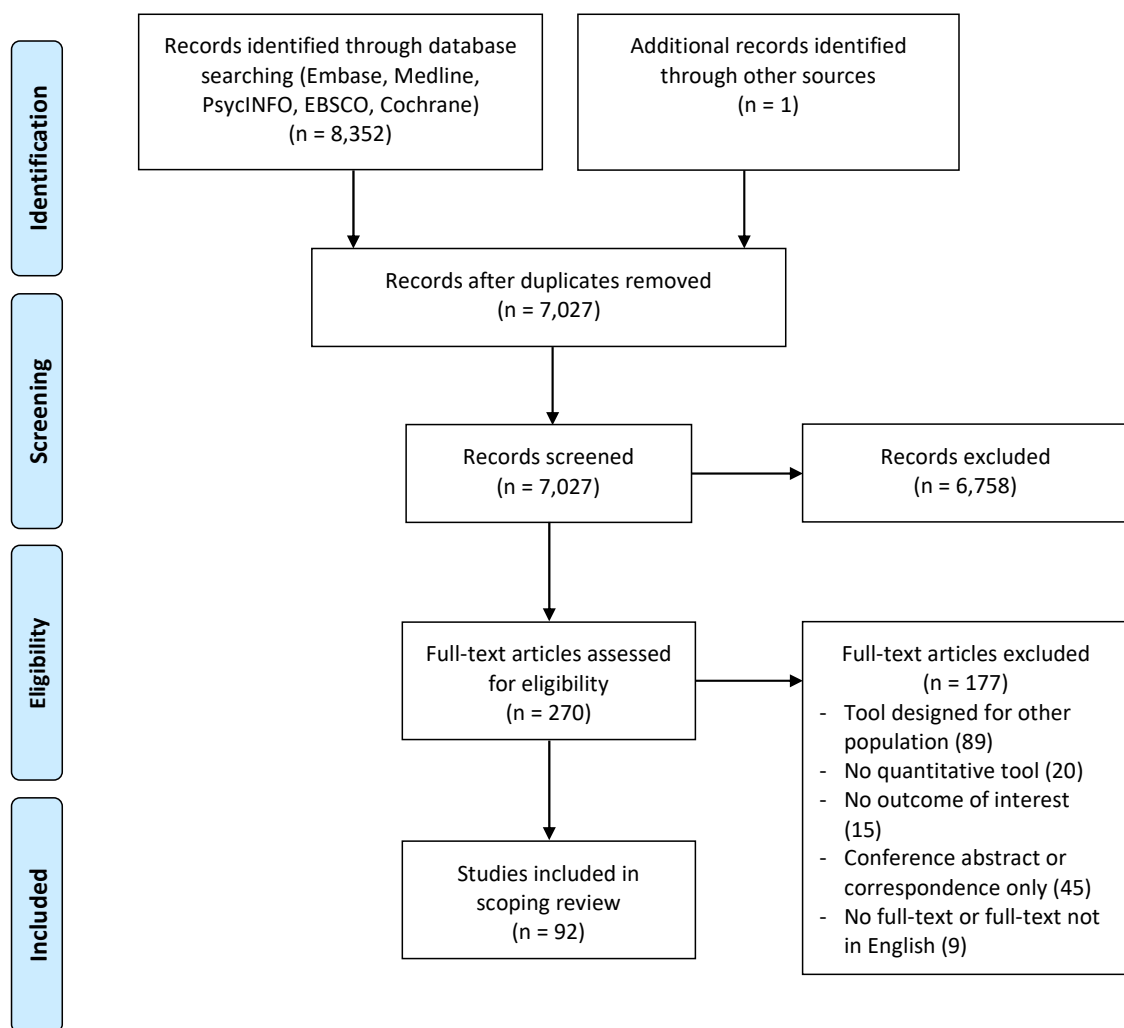


Figure 10. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart for the scoping review

Article overview

Publication dates ranged from 2000 to 2019 with more studies published recently (2000-2004, n=10; 2005-2009, n=22; 2010-2014, n=28; 2015-2019, n=32). The sample size varied from 17 to 91073, with a median of 172 and interquartile range from 74 to 425. 31 of the included studies specifically examined “interns”, 29 examined “residents”, 12 examined “house officers”, and 10 examined “foundation doctors”. The rest of the studies varied in terms of the study population, e.g. “junior medical officers”, “pre-registration trainees”.

The 92 identified studies covered 28 countries with three studies including two countries. The majority of studies (n=78, 84.8%) identified were conducted in high-income countries including US (n=30), UK (n=20), Australia (n=6), Canada (n=3) while only 14 studies (15.2%) were conducted in LMICs e.g. Brazil, India, Malawi, Myanmar, Pakistan, South Africa, Sri Lanka.

Most studies used self-reported questionnaires (n=89, 96.7%) and data were mostly collected using paper surveys (n=35, 19 of which were published in or before 2010) or online web surveys (n=31, 25 of which published in or after 2011). One study used a telephone survey, four used mixed-modes (a combination of paper, online and telephone) and 21 did not specify their survey mode.

We summarised the key terms examined into three major themes after data charting, collation and summary: (a) well-being, which mostly examined the physical, mental and social condition of the interns; (b) educational environment, which focused on the

educational approach, cultural context and physical location where interns experience learning; and (c) work condition and environment, this referred to the aspects of interns' terms and condition of employment. Figure 11 shows the number of studies focusing on different themes of the internship experience. Of the 92 studies included, 53 examined well-being, 57 examined educational environment and 44 examined work condition and environment. 47 studies examined more than one theme while 15 studies examined all three themes. Table 12 presents the most commonly assessed sub-themes within these themes, and tools that were used in multiple studies, and tools with internal validity or reliability assessed directed in their intern population.

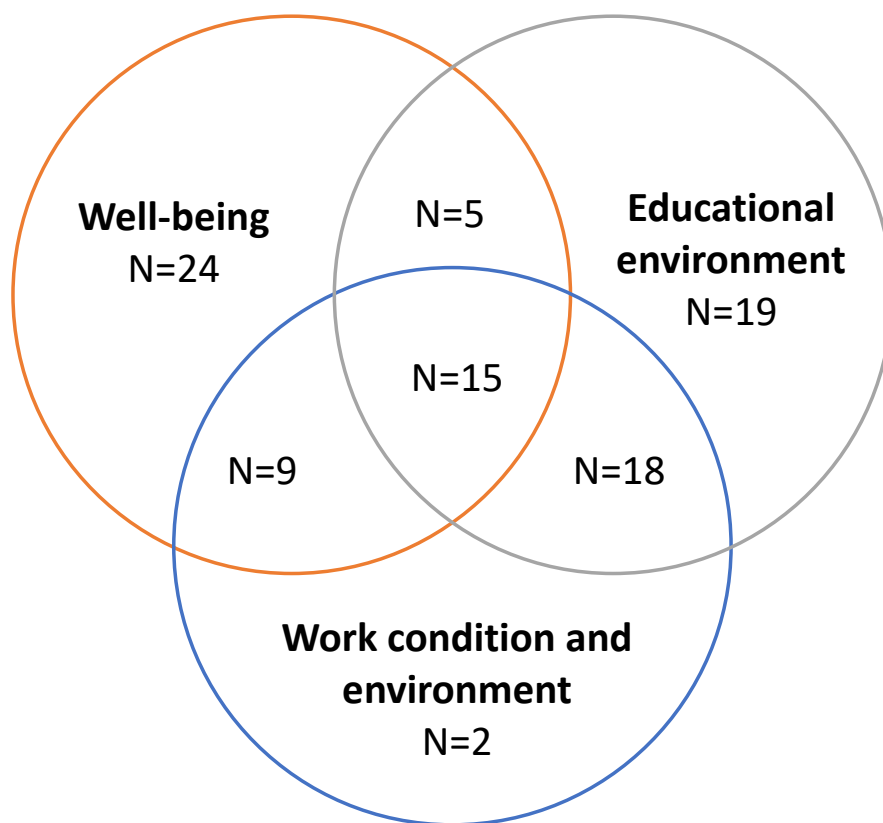


Figure 11. Number of studies focusing on different themes of the internship experience

Table 12. Summary of sub-themes assessed and tool used

	Well-being (n=53)	Educational environment (n=57)	Work condition and environment (n=44)
Sub-theme assessed	- Stress or psychological distress (n=28) - Job satisfaction (n=14) - Depression (n=12) - Sleep (n=11) - Burnout (n=10) - Anxiety (n=8) - Overall wellbeing (n=5) - Fatigue (n=4) - Quality of life (n=3) - Wellness (n=2) - Empathy (n=1) - Coping strategy (n=1) - Mood (n=1) - Loneliness (n=1) - Life satisfaction (n=1)	- Supervision (n=26) - Support (n=15) - Learning or educational environment (n=15) - Teaching (n=14) - Preparedness (n=14) - Teamwork (n=14) - Feedback (n=12) - Communication (n=11) - Induction (n=9) - Professionalism (n=8) - Handoff (n=6) - Career development (n=5) - Overall educational experience (n=1)	- Workload or work hours (n=35) - Safety (n=14) - Harassment or bullying (n=11) - Food and accommodation (n=10) - Pay and remuneration (n=5) - Infrastructure (n=3) - Work-family conflict (n=2)
Tools used in two or more studies used twice or more, or used once but with actual internal validity or reliability evidence within their study population	- Maslach Burnout Inventory (n=6) - Patient Health Questionnaire-9 (n=6)* - General Health Questionnaire-12 or 30 (n=5) - Perceived stress scale (n=4)* - Hospital Anxiety and Depression Scale (n=3)* - Brief resident wellness profile (n=2)* - Connor-Davidson-Resilience Scale (n=2)* - Cooper Job Stress (n=2)* - Copenhagen Burnout Inventory (n=2)* - Occupational Stress Indicator (n=2)* - Pittsburgh Sleep Quality Index (n=2) - UK Medical Career Research Group (n=2) - Anxiety about professional future (n=1)* - Chalder Fatigue Scale (n=1)* - Cohen Perceived Stress Scale (n=1)* - Copenhagen Psychosocial Questionnaire (n=1)* - Effort–Reward Imbalance (ERI) (n=1)* - General stressor questionnaire (n=1)* - Job satisfaction scale (n=1)* - Medical Outcomes Study Sleep Scale (n=1)* - Minnesota Satisfaction Scale (n=1)* - Positive and Negative Affect Schedule scales (n=1)* - State-Trait Anxiety Inventory (n=1)* - State-Trait Depression Scale (n=1)*	- UK Medical Career Research Group survey (n=5) - Postgraduate Hospital Educational Environment Measure (n=4)* - Accreditation Council for Graduate Medical Education Resident Survey (n=2) - Junior Doctor Assessment Tool (n=2)* - Climate for learning (n=1)* - Cognitive Behavior–r Survey - Residency (n=1)* - Friesen et al. 2008 questionnaire (n=1)* - Graduate Medical Education Committee annual survey (n=1)* - Handoff Clinical Evaluation Exercise (n=1)* - Hannan et al. 2017 questionnaire (n=1)* - Learning environment professionalism survey (n=1)* - Lubben Social Network Scale (n=1)* - Mentorship effectiveness Scale (n=1)* - Modified Resident Questionnaire (n=1)* - Reynolds et al. 2019 questionnaire (n=1)* - Short Survey of Perceived Organisational Support (n=1)* - Safety Attitudes Questionnaire (n=1)* - Speaking Up Climates (n=1)* - Touchie et al. 2014 questionnaire (n=1)* - Work Analysis Instrument for Hospitals (n=1)* - Yusoff et al. 2011 questionnaire (n=1)*	- Postgraduate Hospital Educational Environment Measure (n=4)* - UK Medical Career Research Group survey (n=3) - Accreditation Council for Graduate Medical Education Resident Survey (n=2) - Cyber Negative Acts Questionnaire (n=1)* - Graduate Medical Education Committee annual survey (n=1)* - Hannan et al. 2017 questionnaire (n=1)* - Modified Resident Questionnaire (n=1)* - Psychological Safety Scale (n=1)* - Robson et al. 2011 questionnaire (n=1)* - Safety Attitudes Questionnaire (n=1)* - Speaking Up Climates (n=1)* - Work Analysis Instrument for Hospitals (n=1)* - Yusoff et al. 2011 questionnaire (n=1)*

Note: n refers to the number of included studies that examined the specific sub-theme or used the tool. * refers to tools with internal validity or reliability evidence presented in their study population.

Regarding psychometric properties, 75 studies did not test for internal validity in their population although 37 of these 75 studies mentioned that the tool used was previously validated in other studies. Of the 17 studies with actual evidence of internal validity assessment in their study population, 12 tested for construct validity, seven for face validity, four for concurrent validity, three for discriminate validity, two for content validity, one for convergent validity, and one for predictive validity. 64 studies did not test for reliability in their population but 15 of these studies reported that the tool was previously tested for reliability. Of the 28 tools that provided reliability evidence in their study population, internal consistency (Cronbach's alpha) was the most commonly reported reliability assessment (n=27), followed by test-retest reliability (n=3) and inter-rater reliability (n=1).

Well-being

53 studies examined well-being in interns. The most assessed sub-themes included stress or psychological distress (n=28), job satisfaction (n=14), depression (n=12), sleep (n=11) and burnout (n=10). Other studies also assessed fatigue, quality of life.

The most commonly used tools to assess well-being included the Maslach Burnout Inventory (MBI, n=6) for measuring burnout, the Patient Health Questionnaire (PHQ-9, n=6) for depression, General Health Questionnaire (GHQ-12 or 30, n=5) for psychological distress, Perceived Stress Scale (PSS, n=4) for stress, and Hospital Anxiety and Depression Scale (HADS, n=3) for anxiety and depression. Most studies did not report actual psychometric properties in their population, for the commonly used tools such as MBI and GHQ authors reported that they were previously tested for validity and reliability.

One study tested reliability for PHQ-9 and PSS in US interns and both showed good reliability (Cronbach's alpha = 0.74-0.85 for PHQ-9 and 0.82-0.90 for PSS) (155). Another study tested the reliability of HADS in a UK house officer population and indicated that HADS has low internal reliability (Cronbach's alpha = 0.53) (156).

The rest of the tools were only used once or twice in the included studies. There was no widely-used tool for job satisfaction, and tools used for this sub-theme varied in each study from scales (157,158) to a single question on job satisfaction (159,160). Detailed information on the rest of the tools categorised as measuring well-being and the other two themes are provided in Appendix 12.

Educational environment

57 studies examined the educational environment of interns. Supervision (n=26), support (n=16), teaching (n=14), preparedness (n=14) and teamwork (n=14) were the top assessed sub-themes. There were also 15 studies that specifically defined learning or educational environment. Only six studies included handoff and five others included career development.

Of the tools most used to assess educational environment, two of them were large-scale surveys administered in the UK and the US, these reports did not provide validity or internal reliability evidence in the paper published. The UK Medical Career Research Group survey was mentioned in five studies (159–163), which covered different sub-themes including support, handoff, induction, supervision, teaching, feedback, preparedness; and the Accreditation Council for Graduate Medical Education Resident

Survey (ACGME) was cited in two studies (164,165) that assessed teamwork, educational experience and handoff. The other two tools that were used more than once were developed as a stand-alone tool/scale: The Postgraduate Hospital Educational Environment Measure (PHEEM) was used in four studies including in UK (where it was originally developed) (166), Australia (167), Greece (168) and Sri Lanka (169). PHEEM includes three sub-scales including perceptions of role autonomy, teaching and social support, and has 40 questions in total. It asks specific questions on teaching, supervision, support, feedback, teamwork, communication, induction and career development in regard to the educational environment. PHEEM has shown good reliability in the UK and Sri Lanka (Cronbach's alpha = 0.93 and 0.84, respectively) and face validity and construct validity (166,169). The Junior Doctor Assessment Tool was used twice in Australia in which the supervisors assess and rate the communication skills (three questions), professionalism (three questions) and clinical management skills (four questions) of the junior doctor (170,171). The tool showed good construct validity and internal consistency (Cronbach's alpha = 0.88) (170).

Work condition and environment

Out of 44 studies that assessed work condition and environment of interns, workload or work hours (n=35), safety (n=14), harassment or bullying (n=11), food and accommodation (n=10) were the most examined sub-themes. Workload or work hours were usually assessed through actually asking duty hours (155,172,173) or perception of workload (159,163,174). Pay and remuneration and hospital infrastructure (equipment/commodity availability) were less mentioned in the survey.

There was a significant overlap between tools used in this theme and the educational environment theme. For example, four studies used PHEEM which also covered safety, work hours and harassment (166–169); three used the UK Medical Career Research Group survey (159,160,163) which included questions on workload, harassment or bullying, food and accommodation; two used the ACGME Resident Survey which also included questions on safety and workload (164,165). Three separate tools were used in two studies to understand safety issues in the internship period including the Safety Attitudes Questionnaire, Speaking Up Climate, and Psychological Safety Scale (175,176). In the first study, Speaking Up Climate was used in residents from the US to compare against Safety Attitudes Questionnaire, and had good internal consistency (Cronbach's $\alpha = 0.79$) and discriminant and concurrent validity (176). The second validated the Psychological Safety Scale in another US resident population with good internal consistency (Cronbach's $\alpha = 0.76$) and concurrent validity (175).

4A.4. Summary and discussion

This review summarised tools designed to measure medical internship experience. I defined “internship” as the period where doctors in training gain supervised experience working in accredited positions in hospital settings before they are fully licensed and registered to practice unsupervised. I adopted a wide definition of internship experience and summarised the areas examined in 92 articles into three major themes (well-being, educational environment, work condition and environment). I found more tools that have been used in multiple settings for well-being, and less tools for the other two themes.

Medical internship is an important period though less examined or emphasised when compared to medical students or licensed doctors. Failure to account for providing appropriate and well-resourced internship training could lead to challenges in recruiting and retaining these health professionals contributing to the global shortage of physicians, as the internship period appears to be a critical time in career decision-making for most medical graduates (34). Medical graduates are soon to be registered and licensed, decide on a specialty or even migrate to another country citing reasons including negative experience as an intern (37), dissatisfaction with the health organisation (35) and risky working environment (177). While there has been increasing emphasis on physician burnout and how that threatens quality of care, especially patient safety (178,179), it is largely focused on more senior practitioners. However, burnout is also prevalent among interns and junior doctors (27) including in our included studies (180,181), and often times interns are at the frontline of patient management, especially in LMICs (136).

It should be noted that there wasn't a common definition of "internship experience" across different studies and the key areas to measure. The questions included for several major national trainee surveys like the UK General Medical Council (GMC) National Training Survey and the ACGME resident/fellow survey also vary significantly. These larger trainee surveys, conducted by the medical councils, are not exclusively for interns and also their primary objective is to monitor and report on the quality of medical education and training therefore they are less focused on trainee wellness and personal development. For example, the GMC National Training Survey did not include any questions related to well-being until 2019 when a burnout inventory was added (151) and the ACGME resident/fellow survey on well-being only covered questions on "instruction

on maintaining physical and emotional well-being”, “programme instruction in when to seek care regarding fatigue and sleep deprivation; depression; burnout; substance abuse” (153). Moreover, these surveys are tailored to the regulations of that specific country and therefore might not be easily translated to other countries, limiting options for comparison across countries.

Most studies were conducted in high-income countries whereas only 14 studies out of 92 were conducted in LMICs. The fact that few studies have been conducted in LMICs reflects the neglect of this issue in countries with the most significant shortage of doctors (182), and where higher proportions of medical students and interns intend to migrate after qualification citing dissatisfaction with their education and training and poor working conditions (42–44). This not only leads to “brain drain”, but also great economic losses to the LMICs of origin. Some LMICs try and enforce contracts binding interns to a further minimum period of work post-licensure in their country. However, the governments, medical schools and medical councils should also consider methods to reduce “push factors” such as improving conditions for medical students, interns and junior doctors, and optimising their experience throughout their training and professional career (183).

For well-being, I found that studies commonly examined stress and psychological distress, job satisfaction, depression, sleep, burnout and anxiety. More standardised tools have been in use to measure these sub-themes other than sleep and job satisfaction. Despite being widely-used across different populations and settings (184–187), tools like MBI and GHQ did not have evidence presented for internal validity and reliability in our included

studies. Also MBI is not freely available as it charges US\$ 2.5 per respondent (188), which poses challenges for wide use. I recommend that these previously validated tools be tested in new contexts and populations when used.

For educational environment, most studies included questions on supervision, teaching, support, but few examined induction, communication, career development which perhaps should be given more emphasis career decisions are commonly made during the internship period (34). There has been a lack of widely-used tools in interns other than PHEEM. A previous systematic review also suggested the use of PHEEM for postgraduate medicine's educational environment (189). Most other widely-used tools for this theme that I included in the analysis either was tailored to specific country settings (e.g. the ACGME survey (164,165) and UK Medical Career Research Group survey (159–163)) or only focused on specific sub-themes. Given its greater use I recommend the further adaptation and use of PHEEM to measure educational environments and enable comparison across settings.

Lastly, for work condition and environment, workload, safety, pay and remuneration were more commonly examined in my included studies. Infrastructure e.g. equipment and commodity availability were less measured which might reflect the limited number of studies conducted in LMICs. I also did not identify any widely-used tools other than PHEEM. While PHEEM does include questions on safety, questions are limited to two on physical safety and no-blame culture (166). To gain a better picture of this topic I recommend the use of additional tools on safety or safety climate as transforming organisational culture may be critical to improving patient outcomes. Also noteworthy for

LMICs there should be questions on pay and remuneration, as together with infrastructure and resource adequacy these factors are commonly cited as reasons for poor internship experience (54).

Table 13. Selected recommended tools for measuring internship experience

Tool name	Number of questions	Description	Sub-themes assessed	Internal validity evidence	Reliability evidence
Maslach Burnout Inventory (MBI)	22	3 components of burnout (emotional exhaustion, depersonalisation, personal achievement) 7 level frequency scale from “never” to “daily”	Burnout	Previously tested	Previously tested
Patient Health Questionnaire-9 (PHQ-9)	9	4 level frequency scale from “not at all” to “nearly every day”	Depression	Previously tested	Internal consistency (Cronbach’s alpha = 0.74-0.85), test-retest (155)
General Health Questionnaire-12 or 30 (GHQ-12 or GHQ-30)	12-30	- Short versions of the GHQ-60 questionnaire for psychological distress 4 level frequency scale from “not at all” to “much more than usual”	Psychological distress	Previously tested	Previously tested
Perceived Stress Scale (PSS)	10	4 level frequency scale from “never” to “very often”	Stress	Previously tested	Internal consistency (Cronbach’s alpha = 0.82-90), test-retest (155)
Postgraduate Hospital Educational Environment Measure (PHEEM)	40	3 categories (role autonomy, teaching, social support) 5 level Likert scale from “strongly disagree” to “strongly agree”	Educational environment, supervision, induction, communication, feedback, career development, teamwork, teaching, support, work hour, harassment or bullying, safety, food and accommodation	Face validity, construct validity (three factors) (166) Construct validity (one factor) (169)	Internal consistency (Cronbach’s alpha = 0.93) (166) Internal consistency (Cronbach’s alpha = 0.84) (169)

The list of the tools I reviewed that measured medical internship experience could be of interest to researchers, medical educators, human resource managers and policy makers. Depending on the areas of interest, I recommend the tools that have been widely-used in different settings and with sufficient evidence of good psychometric properties, for example as listed in Table 13. I also strongly suggest continued testing and reporting of internal validity and reliability when using such tools in new contexts and specific populations. In the future the development of a comprehensive “internship experience tool” might allow comparison across countries and time, which is the aim and goal for Section 4C.

Several limitations should be considered for this review. To start with, this was a scoping review, therefore I did not aim to systematically assess the quality of included studies. While I reported on the psychometric properties for each study, I only focused on whether they tested for internal reliability and validity within their population. I did not report the tools that were only used once in our included papers and cited that their tools were “previously validated” in other populations. Tracing back to the original reports to check whether the earlier validation work could have improved our report. Second, during the screening, I found different terminology for the study population including house officer, resident, junior doctor, trainee doctor. For those less-commonly used terms, I hand-searched other resources on the requirement for license and registration in the country of study to ensure the population was pre-registered/licensed. However, I may have missed several studies on interns. Additionally, for studies that examined US residents, I excluded those that only investigated one specialty (e.g. surgery residents) considering that their areas of focus might be on the individual specialty instead of

general experience. For some studies on US residents I had to assume the population was pre-licensure, however, some included all residents from first to sixth or seventh year (190,191) and therefore might not be comparable with an intern in other settings. Last but not least, my disaggregation of themes and sub-themes was based on analysing and interpreting the studies' methods, results, tables and figures. Only half of the included studies provided their actual questionnaire in the paper or appendix and this made the thematic analysis challenging. To address this, each study was examined by two reviewers to extract key terms and a list of sub-themes was formed iteratively and emergently during the data extraction process.

Section 4B. A mixed-methods analysis of internship experience in Kenya

This section includes content from Zhao Y, Mbutia D, Gathara D, Nzinga J, Tweheyo R, English M. *‘We were treated like we are nobody’: a mixed-methods study of medical doctors’ internship experiences in Kenya and Uganda. BMJ Global Health. 2023 Nov 1;8(11):e013398.*

4B.1. Background

Internship is an important time period for medical doctor training as these junior doctors transit from supervised learning in medical schools to rapidly assume significant clinical responsibility under supervision, and it can be challenging (17). Medical interns experience highly demanding working hours, unsatisfactory pay and remuneration, and depending on conditions of training facilities interns also experience low availability of resources, limited supervision and feedback (29), lack of responsiveness to basic psychological needs that result in rapid burnout and stress-related psychological problems (27,28). All of these pose challenges both to the workforce’s well-being but also threaten quality of care, especially patient safety (178,179). Additionally, failure to provide appropriate and well-resourced internship training also leads to challenges in recruiting and retaining these health professionals and subsequently the global shortage of physicians, as the internship period appears to be a critical time in career decision-making for the majority of medical graduates (34).

My scoping review on tools for measuring internship experience (Section 4A) highlighted the scarcity of studies focusing on interns in LMICs where education and working conditions could be worst. More specifically for Kenya, which is the country of focus for this thesis, I did not identify any published quantitative survey that investigates internship training experience from the interns' perspective. The closest quantitative study is a cross-sectional survey conducted in Kenyatta National Hospital in 2003 with 62 medical practitioners and 283 nurses where the burnout rate was as high as 95.4% (192). Additionally, one qualitative study was conducted with 32 interns and 18 supervisors across seven district hospitals in 2015 to understand medical graduates' preparedness for internship responsibility as well as the working, training conditions and social support received by interns (21). Key findings included deficient equipment and medication, inadequate living accommodation and food provision. Interestingly, interns reported that supervision was inadequate whereas supervisors felt that "they provided adequate supervision and that interns lacked the ability to initiate communication with them" (21). Nonetheless, a gap exists as previous research only provided a partial view using qualitative approaches, and there is a need for large sample size quantitative surveys to understand the scope of these challenges as well as provide a more complete understanding through synthesising quantitative and qualitative data. In this section, I present the findings on medical doctors' internship experience in Kenya using data from a questionnaire survey of 358 interns and junior MOs and semi-structured interviews with 40 junior MOs and consultants, using a mixed-methods approach.

4B.2. Methods

Study design and framework

In this study, I used a convergent mixed-methods approach (103) to gain an in-depth understanding of the internship experience of junior MOs in Kenya. Data collection and analysis were guided by the three major themes identified in the scoping review (Figure 11), i.e. wellbeing, educational environment and work condition and environment. The mixed-methods approach included a quantitative questionnaire survey with current MO interns and junior MOs as described in Section 2.6 and qualitative semi-structured interviews with junior MOs and consultants as described in Section 2.8. Data collection for these two types of data were both informed by the scoping review themes, data were collected and analysed in parallel separately, and integration occurred at the data analysis and interpretation phase where I triangulated findings from both qualitative and quantitative data under each major theme (Figure 12).

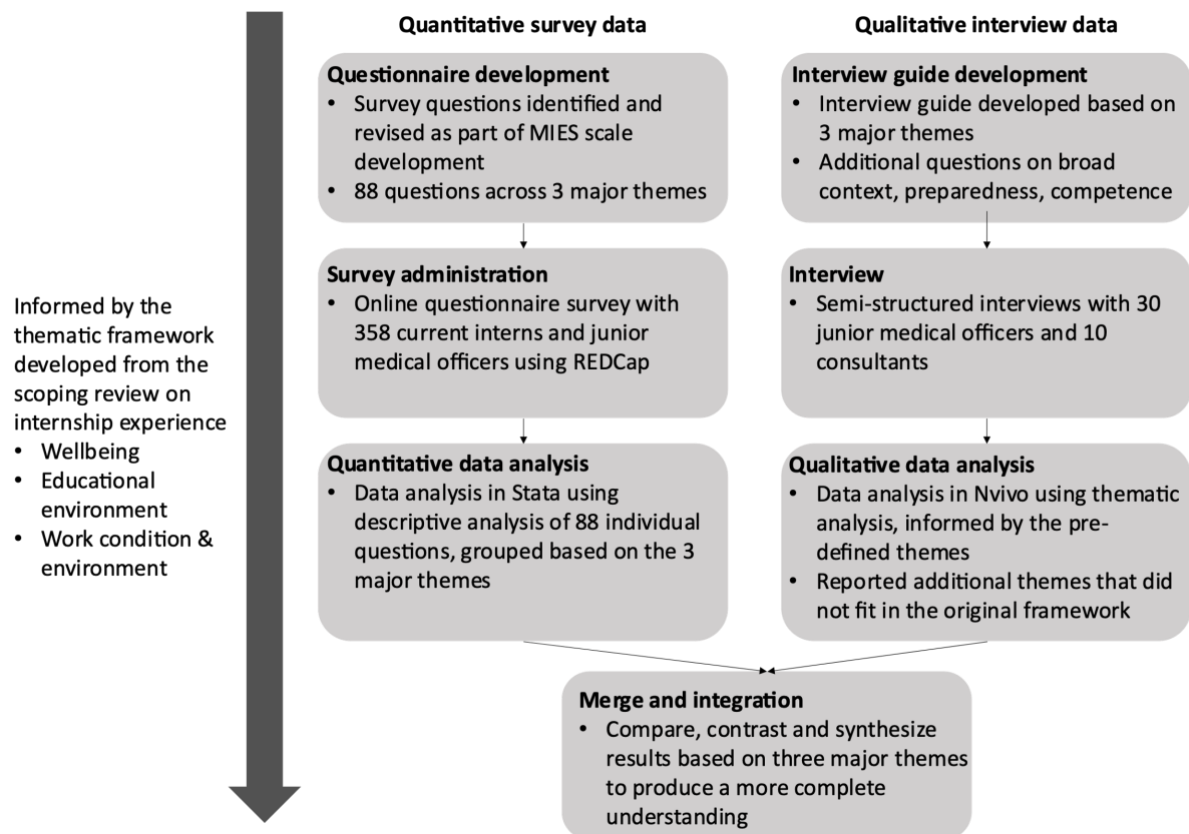


Figure 12. Flowchart of the convergent mixed methods approach to understand internship experience

Data collection

Quantitative data were collected from 358 current MO interns and junior MOs using an online questionnaire survey between Nov 2021 and May 2022. The survey was administered through REDCap. I first engaged with the Kenya Medical Association Young Doctor Network and Kenya Young Doctor Caucus as well as facilities in the Clinical Information Network operated by KEMRI-Wellcome Trust Research Programme (KWTRP) and asked relevant contacts to share the survey link with eligible respondents. I also connected with three major medical schools' deans (University of Nairobi, Kenyatta University and Jomo Kenyatta University) and asked them to share the survey link through respective cohorts' class representatives. Lastly, I liaised with KMPDC, which agreed to share the survey to all eligible MOs through their registry using short message

service (SMS). Data collection in Kenya started in Nov 2021 and ended in May 2022. One GB of data (worth 250 KES or 1.8 GBP) was given to respondents who fully completed the survey. An initial sample size of 254 was estimated using the formula for calculating sample size for cross-sectional studies " $n = [DEFF * Np(1-p)] / [(d2/Z21-\alpha/2)*(N-1)+p*(1-p)]$ " with an estimated 67% prevalence of burnout among physicians (184). A total of 498 started the survey and 358 (72%) fully completed the survey and were included for analysis. The final survey instrument included adapted questions from existing tools and additional questions highlight common challenges encountered during internship.

Qualitative data were collected through semi-structured interviews with 30 junior medical officers and 10 consultants between June and Sept 2021. Respondents were recruited using a snowballing approach or a purposive approach until data reach saturation, with consideration of respondent characteristics (internship hospital, current occupation, affiliation etc.) to achieve variation and gain a broader perspective of the phenomenon. Regular meetings among the interviewers were set up during data collection to monitor progress and discuss preliminary findings for quality assurance.

Data analysis

There are debates in terms of the analysis and interpretation of Likert items and Likert scales, especially regarding the ordinal nature and nonnormal distribution of Likert data and the use of parametric vs. non-parametric tests (193–196). It is recommended presenting frequencies of responses (percentages of responses in each category) for individual items and a total score for a Likert scale (several items) (194), and parametric vs. non-parametric tests perform equally well regardless of distribution (193,195). For the

descriptive analysis of my survey data, I created binary categories by calculating the percentages of respondents that selected “strongly agree” and “agree”, or “very often” and “often” for each item, and I presented the proportion for each item. Some items are “positive items” where agreement is interpreted as favourable thus the higher proportion the better experience; and some other items are “negative items” where disagreement is interpreted as favourable thus the lower proportion the better experience (197). I also compared responses to all items between different internship hospital categories (Level 4 small hospitals, Level 4 large hospitals, Level 5&6 hospitals), gender and graduation cohorts to understand potential differences. All statistical analyses were performed using STATA V.17.

Semi-structured interviews were audiotaped and transcribed, with all personally identifiable information removed and replaced by unique anonymous codes, and imported into Nvivo to manage coding and analysis. I used a thematic analysis approach to code the data, guided by the thematic framework identified from the scoping review (Figure 11). Within each thematic area, sub-themes were further refined and summarised inductively. As the interview guide is relatively broad and there were new sub-themes merged from the coding analysis that did not fit in the thematic framework, I listed them separately in the result chapter under “other subthemes”. These are usually broad contextual information that the quantitative survey did not or could not measure.

The integration process involved merging and comparing the results from the quantitative and qualitative data to provide a more complete understanding than from the quantitative or qualitative results alone (103). I organised the results by the three

major themes and compared the results from survey questions with corresponding sub-themes where relevant. This included using qualitative findings to validate or explain quantitative results. Preliminary findings were presented to the other data collectors (DM) as well as all other authors who were not directly involved in coding to triangulate and increase the trustworthiness of the findings.

4B.3. Results

A total of 358 respondents fully completed the questionnaire survey and 40 participated in the semi-structured interviews. Socio-demographic characteristics of these participants can be found in Table 14 and Table 7. Thirty-seven percent of the survey population were MO interns at the time of survey, having completed 6.5 months internship training on average; the rest were post-internship MOs that completed their internship from 2018 to 2022. The University of Nairobi contributed to 56% of the survey population, it is also the largest medical school in Kenya graduating nearly half of the MOs. For the semi-structured interview, most of the MOs and consultants were working in public sector facilities. Full results for the survey including means of each item stratified by gender and internship graduation year are shown in Appendix 13 and in this section I present selected results.

Table 14. Characteristics of the Kenya survey population

	Medical intern (N=131)	Medical officer (N=227)	Total (N=358)
Gender (%)			
Male	57.3%	47.6%	51.1%
Female	42.8%	50.2%	47.5%
Others/prefer not to say	0	2.2%	1.4%
Age (mean, SD)	27.6 (2.2)	28.9 (2.1)	28.4 (2.3)
Marital status (%)			
Single	91.6%	74.5%	80.7%

Married	8.4%	23.8%	18.2%
Divorced	0	0.4%	0.3%
Widowed	0	0.4%	0.3%
Separated	0	0.9%	0.6%
Months of internship training completed (for intern only, mean, SD)	6.5 (3.1)	-	
Year of completing internship (for medical officer only, %)			
2022	-	22.9%	
2021	-	23.8%	
2020	-	26.4%	
2019	-	18.5%	
2018	-	8.4%	
Medical school graduated (%)			
University of Nairobi	48.1%	60.8%	56.2%
Kenyatta University	24.4%	9.3%	14.8%
Kenya Methodist University	1.5%	7.9%	5.6%
Maseno University	5.3%	8.4%	7.3%
Jomo Kenyatta University	12.2%	4.0%	7.0%
Others	8.4%	9.7%	9.2%
Funding for medical school (%)			
Completely self-funded	45.0%	51.5%	49.2%
Received full or partial government scholarship	51.2%	45.8%	47.8%
Others	3.8%	2.6%	3.1%
Internship hospital level (%)			
Level 4 small (bed number < 196)	31.3%	25.6%	27.7%
Level 4 large (bed number > 196)	25.2%	28.6%	27.4%
Level 5	32.1%	33.5%	33.0%
Level 6	3.1%	6.6%	5.3%
Others	8.4%	5.7%	6.7%
Internship hospital ownership (%)			
Public	77.9%	77.5%	77.7%
Private	0.8%	0.9%	0.8%
Mission	13.0%	15.9%	14.8%
Others	8.4%	5.7%	6.7%

Wellbeing

As shown in Table 15, while most interns were satisfied with their internship job, such as being able to help people (q17, 86% chose often or very often), believing they can make a difference through their work (q22, 77%) and proud of what they can do (q23, 82%), most interns' responses to stress, depression and burnout related questions were less positive. For example, 62% of respondents often felt that they were unable to balance their work

and personal life during the internship (q1) and 55% often felt worn out because of their internship work (q29).

Table 15. Selected items and proportion of respondents that selected “agree” and “strongly agree” or “often” and “very often” from Kenyan medical doctor internship experience survey

Green items are “positive items” where agreement is interpreted as favourable thus the higher proportion the better experience Red items are “negative items” where disagreement is interpreted as favourable thus the lower proportion the better experience			Internship hospital category				Total (n=358)
			L4 small (n=99)	L4 large (n=98)	L5&6 (n=137)	Other (n=24)	
Wellbeing	Q17	I get satisfaction from being able to help people.	80%	87%	88%	88%	86%
	Q20	My ability to keep up with clinical techniques and protocols makes me feel pleased.	70%	80%	75%	71%	74%
	Q22	I believe I can make a difference through my work.	75%	86%	74%	63%	77%
	Q23	I am proud of what I can do to help as a medical intern.	81%	84%	81%	83%	82%
	Q1	I feel that I am unable to balance my work and personal life during my internship.	59%	58%	64%	79%	62%
	Q2	I feel nervous and/or stressed because of my internship work.	66%	49%	61%	58%	59%
	Q29	I feel worn out because of my work as a medical intern.	58%	53%	56%	50%	55%
	Q30	I feel overwhelmed because my case workload seems endless during the internship.	56%	50%	61%	46%	56%
Educational environment	Q39	I have good clinical supervision at all times during my internship.	44%	61%	63%	58%	57%
	Q46	I have enough clinical learning opportunities for my needs during the internship period.	54%	64%	66%	54%	62%
	Q52	My internship training makes me feel ready to be an independent medical practitioner.	72%	82%	80%	71%	77%
	Q58	I feel part of a team working here.	64%	75%	75%	67%	71%
	Q61	I have good collaboration with other medical practitioners, interns and clinical staff.	85%	83%	83%	88%	84%
	Q54	I am pre-occupied with administrative work that impeded my ability to learn.	16%	16%	21%	17%	18%
Work condition and environment	Q65	My work hours are appropriate during my internship.	15%	19%	20%	33%	19%
	Q66	My workload is reasonable during my internship.	13%	28%	18%	50%	22%
	Q71	There is a no-blame culture in my internship hospital.	18%	21%	29%	17%	23%
	Q85	The internship hospital has good quality accommodation for me when on call.	23%	38%	36%	63%	35%
	Q86	There are adequate catering services provided by the internship hospital when I am on call.	7%	18%	20%	38%	17%
	Q87	The internship hospital has good internet connection for my study and work need.	16%	17%	27%	46%	23%
	Q88	The internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need.	21%	30%	42%	54%	34%

	Q68	I have to perform inappropriate tasks during my internship.	42%	32%	39%	54%	39%
	Q69	There is gender discrimination in my internship hospital.	17%	17%	14%	13%	16%
	Q70	There are other forms of discrimination (e.g. ethnicity, religion, tribe, disability) in my internship hospital.	26%	26%	27%	33%	27%
	Q81	I get bullied or victimised within my internship hospital.	29%	22%	27%	29%	27%

Note: Data is presented as the proportion of respondents that chose “agree” and “strongly agree” or “often” and “very often”. Green items are “positive items” where agreement is interpreted as favourable thus the higher proportion the better experience; red items are “negative items” where disagreement is interpreted as favourable thus the lower proportion the better experience. Items presented here are those of particular interest (have a high or low proportion, with difference between hospital categories or could be triangulated with qualitative data) and full results are shown in Appendix 13.

According to the qualitative interviews, emotional stress came from a variety of sources, including long working hours accompanied by the shortage of staff, first time facing deaths and breaking news to relatives, and for some moving into a new town for internship. Additionally, interns lived in the constant fear of being “added weeks” if they do not satisfy the requirement from supervisors. As internship requires supervisors signing interns’ logbooks, they could ask interns to repeat some rotations in certain specialty and work additional weeks outside of the 12-months internship, until the supervisors are satisfied. This was sometimes considered as being decided subjectively by the consultants. Furthermore, these added weeks are not paid so interns did not have any source of income if this sanction is imposed. Interns described “having a burnout is like the order of the day in internship” (Medical officer, M07 – L5 Public – Mission), especially in some more intense rotations such as OBGYN.

“Cause like with my group, we started 12 interns and I think it's only two who didn't get weeks. So amongst the 10 of us who got weeks, those who are very passionate about medicine they start depending on your personality, some tend to start doubting themselves or feeling inadequate and feeling very personally attacked and therefore it becomes an even more stressful experience given already the high workload and getting accustomed to a new town, first time in your life working. So it just tends to add another layer of anxiety and depression around it.” (Medical officer, M13 – L5 Public – Public)

“I could say that, you are less...(burnout) got to a point where it was more of just pushing paper and not necessarily being keen to learn and gain the skills. Sometimes because you are tired you would find ways to make the work lighter for yourself which would mean sometimes making shortcuts just so that you are not too overburdened. Sometimes it also, sometimes you would find that you end up brushing with colleagues because some colleagues would then, who are completely burned-out would choose not to show up to work so the burden is now on you.” (Medical officer, M04 – L5 Mission – Public MO)

In comparison, while some consultants acknowledged that internship is indeed stressful, some others commented that interns nowadays are not as resilient as the older generation:

“I would probably think that we have softer people in medicine. Their resilience is not as strong as people who were there before us. So anything small they are quick to say this is too much or partly this is, I would think that is the reason, partly we have more freedom of expression and they say why should I do that much when others are not working hard. Of course in general and in healthcare there is burnout but it is on what is expectations are for the person who is working there.” (Consultant, C03 - L6 Public - Paediatrics)

Some interns reported receiving emotional support from consultants, peers and friends through gathering after work or Bible study in one Christian hospital. For some other interns they did not receive any support to relieve their pressure. Interns suggested that more accessible mental health counselling provided for interns and coping strategy classes as part of the undergraduate curriculum would be helpful.

“Basically there was no support, it is just you being, just adjusting to the pressure which is coming. You just adjusting and finding a way to loosen up or ease the pressure you are going through.” (Medical officer, M05 – L4 Public – Resident)

Educational environment

Interns highly appreciated the clinical exposure during the internship, survey results suggested that 76% agree that they have adequate opportunities to acquire the appropriate practical procedure skills for clinical practice (q51 as shown in Table 15) and the internship training made them feel ready to become independent medical practitioners (q52, 77% agree or strongly agree). Many interviewees also emphasised that getting hands-on clinical experiences was very helpful.

“I think I enjoyed the most about my internship is now practicing the real medicine, you know, in college, just books and that junior clerkship in [Hospital C] you are not able to handle the patients as your, as been the primary doctor. So been a person in

charge about that patient it was quite interesting and it was quite exciting, knowing that you are the primary person and you are relating things and especially seeing a good outcome from your patient it is quite satisfactory. And it is something you are happy about.” (Medical officer, M05 – L4 Public – Resident)

According to the questionnaire survey, supervision and teaching were rated moderate to high by respondents. Over half of the interns felt that they had satisfactory clinical supervision at all times (q39), however only 44% of those interned in Level 4 small hospitals felt they had good supervision at all times, as opposed to 61% and 63% in Level 4 large and Level 5 & 6 hospitals (Table 15). Poor supervision due to consultants being unavailable was also reported by interviewees and sometimes interns were the only staff managing the wards or had to perform certain procedures unsupervised.

“We had like, in some rotations we only had one consultant. So if you have one consultant that means he can't be available every day to guide you, so at times you have to manage the ward alone as an intern....Like when I was doing pediatrics, there's the time the consultant was on leave, and the MO was on leave. So, we were the only ones managing a whole ward as interns and it's a referral hospital.” (Medical officer, M27 – L4 Public – Private)

“I would like to say we also had good supervision which helped us to fine tune our skills compared to like I'd hear some of my colleagues say they have already done several Caesarean sections. But via YouTube because, like I said, medical school didn't really give us enough skills for that. So they would just, they show up to a facility, they find they have no supervision and they're the ones who are supposed to do the Caesarean sections. So they come out having done so many Caesarean sections, but the question is what were they exactly doing? Compared to us who would probably not do as many caesarean sections, but each of them we would get excellent supervision.” (Medical officer, M04 – L5 Mission – Public)

In comparison, consultants commented that they are already very stretched given the shortage of staff in the facilities thus they “cannot be with the intern at every point of the internship” (Consultant, C06 – L5 Public - Paediatrics). In response to interns' comments of supervisors being too tough or giving them unreasonable demands, consultants

indicated that current interns' roles were much more relaxed than their own experience and interns' expectation are "not realistic to what is on the ground" (Consultant, C07 – L6 Public – Paediatrics). Additionally, consultants themselves do not receive any support or rewards from the administration for supervision and some suggested that the KMPDC should provide some remuneration for supervisors.

"Unfortunately or fortunately I'm not receiving anything apart from thanks, a hearty thanks. But it would be good for even the medical council, because this is somebody who is sacrificing their time, going out of their way to ensure somebody is having a, is being trained in the right way. So for the sake of posterity, some of the monies that the Medical Council collects should be used in remunerating, and also capacity building and also recognising the best interns." (Consultant, C04 - L5 – Mission - OBGYN)

While the survey results suggested that interns felt part of the team (q58, 71% agree or strongly agree) and had good collaboration with other doctors, interns and clinical staff (q61, 84%), interview data also pointed out some occasions where collaborations with nurses and clinical officers weren't always smooth. Senior nurses and specialised clinical officers sometimes looked down upon junior interns and created a hostile environment for learning and working.

"Okay, what I didn't enjoy was conflicts from some nurses who would object whatever decisions you arrived at, because they said that they are more experienced. They will do things a certain way so they go against whatever decisions you lay down. And now the working round the clock shift. So nobody will understand this. They say internship is more of an 'internshit' so you just have to bear all of it and get done with it." (Medical officer, M02 – L5 Public – Public)

Additionally, the role of internship coordinators was commonly discussed in the qualitative interviews. This specific role is usually carried out by a consultant in each facility that coordinates internship rotations, ensures there is a proper mechanism for

supervision and monitors the performance of the interns. Some interns reported that their internship coordinators were really helpful and resolved their concerns, while others had poorer experiences where the coordinators were not being supportive.

“...like but then for example, the internship coordinator, whenever there was an issue or like conflict in the hospital between an intern and another staff member, they would say, you know, I'm here to support you, don't attend those sort of hospital hearings or sittings without the internship coordinator to argue out to the interns point of view, but then they were never there, you know, or if you had an issue with your housing, the security and you raise your complaint and you're told it will be sorted out but then when you follow it up again you're told we do not answer to interns.” (Medical officer, M30 – L4 Mission – Business)

Work condition and environment

High workloads and long working hours were reported by interns in qualitative interviews as well as in survey data (Table 15). Only 19% agreed that their work hours were appropriate (q65) and 22% agreed that their workload was reasonable (q66). According to the interview data, some interns were on call for 48 hours to 72 hours continuously. Some interns felt that they were “treated as slaves to the hospital” (Medical officer, M27 – L4 Public – Public).

“And then there was time there was only one intern in maternity, and they were expected to be on call every day for their entire rotation which is insane, and I think the guy even had to print a notice and just say “the intern is unavailable for work this week” and just disappear because he said he was about to go mad.” (Medical officer, M30 – L4 Mission – Business)

While only 16% interns agree with existence of gender discrimination in their hospital (q69), other forms of discrimination were reported linked to ethnicity, religion, tribe or disability (q70, 27% agree or strongly agree) and some reported getting bullied or victimised within their hospital (q81, 27%). There were cases from interviewees suggesting that bullying and racial discrimination existed in some facilities.

Yeah. But then when I transfer transition to internal medicine, it was it was a hell. I was first of all, racially profiled. Yes, I was racially profiled and at some point, it almost generated to physical abuse. I had a file flung at my face.Now the hospital I interned in is predominantly, okay well, it's predominantly [X ethnicity], or most of the staffing, the clientele's are [X ethnicity]. So it goes without saying a lot of these staff are...So you'd find you're being treated a bit different. But it was just by these two people in this one department. You're treated different, you know blame games. And then right in front of the patient, you know, somebody's looking at you and making statements like you can barely manage your weight, leave alone run a ward round, in front of a patient....So I remember that morning it escalated into a very bad fiasco, this man flung a file at my face. And then you have nowhere to report it 'cause they are people who are meant to sign you out and are people who are meant to give you signature to leave. The same person who is your internships supervisor is actually deep needing into the whole thing. (Medical officer, M08 – L4 Private - Private)

While accommodation, internet connection and diagnostics, equipment and medication supply are required by the KMPDC for internship training centres, over half of the interns thought those were lacking (q85, q86, q87, q88 in Table 15). Interns also rated low many patient safety-related questions. Due to staff shortage, many tasks that are supposed to be done by consultants were also conducted by interns including caesarean sections, admitting, discharging, and reviewing patients. 39% of survey respondents thought that they had to perform inappropriate tasks during their internship (q68), especially for those in Level 4 small hospitals. Only 23% thought that there is a no-blame culture in the facility (q71). Resource constraints were reported as one common reason for substandard patient safety. Survey respondents who interned in Level 4 small hospitals rated most work condition and environment questions poorer than their counterparts.

“And then the issue of supplies, you might find that you don't have basic things like probably... there's no water in the hospital, so you can't do surgeries, the autoclave broke down, so you don't have linen, and then at times they don't even have power in theatre and then drugs of course, we had to at times you had to buy drugs from outside. Then of course still on the same issue of supplies, we find that laboratory at times didn't have reagents. You actually have to do the lab works outside. At times it's as basic as a full haemogram, you can't do a full haemogram in a level 4 hospital! You have to send samples outside. At times you have to do a caesarean section without a

check Hb, you don't even know how the platelets are.” (Medical officer, M27 – L4 Public – Public)

“I think the strategies are good on paper, the issue now is, these hospitals are underfunded, they don't have most of the things that are on paper, so you end up seeing a lot of improvisation and all that, but at least the processes are there on paper but on the ground the implementation becomes a bit hard because of the lack of resources.” (Medical officer, M17 – L4 Public – Private)

Other subthemes from the qualitative data

Interns mentioned broad political contexts such as decentralisation, strikes, as well as Covid-19 impacted their internship experiences. This ranges from decentralisation leading to upgrades of facility infrastructure but also in some counties delayed payment so that supervisors do not show up for work, strikes leading to spikes in workload in some internship hospitals and closure of some other internship hospitals. For some interns, Covid-19 led to fewer patients and elective procedures in hospitals, whereas some others managed more Covid-19 patients.

Some consultants expressed concerns with interns' preparedness coming into internship as well as competence post-internship. Some felt that interns are competent in making diagnoses and giving necessary treatment but lack a clear understanding of medical pathophysiology. However, the relatively short internship rotation, and in some hospitals a huge number of interns, made in-depth training challenging, and several consultants voiced their concern regarding interns' competence post-internship.

“They go for a clinical, a child health rotation for about a couple of weeks, they do a new-born rotation for a couple of weeks, so in terms of practical in person or practical time they have quite little and time in the rotations. And that vis a vis the large numbers that enrolled for classes. You get individuals who are not able to take the practical aspect of their studies. So it's sort of a conveyor belt. It's just a large number that are being conveyed through the system.” (Consultant, C08 – L6 Public – Paediatrics)

“The other thing I am seeing is deteriorating is the assessment. Long time ago when we were still under the central government, the assessment of medical interns was a very formal event where the HNT sits and consultants sit down and they do a proper assessment, so it is not an individual thought, it is not something that you just meet a consultant in the corridor and they sign your book or your log, it was a formal discussion and the decisions on who has qualified and not was on a consensus basis but we find that with devolution that seems to have deteriorated...so you may find someone whom really you know is not really being competent but been released yet...you find you are struggling even when you try to go for masters, they are struggling because they didn’t quite get things right at the internship level.”
(Consultant, C07 – L6 Public - Paediatrics)

Noteworthy, psychiatry and community health were added as two compulsory rotations for internship training by the KMPDC in 2020. However, interview data suggested that these rotations were not always implemented in practice, due to reasons ranging from a lack of mechanism and structure for providing such rotations, to some internship coordinators’ intentional neglect. One intern commented that “there is nothing we did for the community, we just signed the log books.” (Medical officer, M28 – L5 Public – Public)

“Personally I don't, the government has not come up with proper structures about how we should do ... There is the mental health that they introduced recently, the government has not come up with structures like okay you want us to do a mental health rotation for these students, do we take them to [Hospital AX]? Do we take them to [Hospital BN]? Do we take them to do counseling in the outpatient counseling department? There is no structure for, even in community health. Do we send them to a slum to go maybe, or do they during the polio vaccine, do they go to the community and give the vaccine, what does that mean? There is no structure.”
(Consultant, C04 – L5 Mission – OBGYN)

“We also had, because we were the first lot that had the mandatory psychiatry rotation in internship, but then just from the onset, coordinator, who's a surgeon just told us like that's not really going to happen. “I'm not going to give you time to rotate in psychiatry” ... And then we're also told that, you know, let's like forget about the community health rotation which some of us had great interest in ...” (Medical officer, M30 – L4 Mission – Business)

4B.4. Summary and discussion

Through analysing quantitative data collected from 358 junior MOs and qualitative data from 40 semi-structured interviews with junior MOs and consultants, I investigated the internship experience of junior medical doctors in Kenya. Most of the quantitative and qualitative findings are similar across different themes. My analysis suggested that while interns were satisfied with their job, many interns reported suffering from wellbeing problems, working unreasonable hours due to staff shortages as well as coping with challenging working environment such as lack of adequate resources and poor safety climate. As for supervision, quantitative survey results suggested that most interns were satisfied with their supervision received, however in qualitative work many interviewees highlighted challenging scenarios where they had poor supervision due to consultants not being available or even experiencing bullying and racial discrimination from consultants.

Over half of the junior MOs surveyed experienced wellbeing problems including signs of stress, anxiety and burnout. Internship training could be stressful due to the quick transition from undergraduate supervised learning to being the frontline doctor, and many previous surveys also suggest that depression and burnout are prevalent among the intern population: 26% interns experienced depression in a US cohort of 740 interns using the PHQ-9 scale (198); 42% of 101 Irish interns surveyed experienced two of the three MBI burnout symptoms (emotional exhaustion, depersonalisation, and a sense of low personal accomplishment) (180); 43% of 159 Myanmar house officers had one or more MBI burnout symptoms (181). My current survey did not use these tools or did not use them in their original forms (some questions were dropped during the survey development phase) therefore I cannot analyse my data against recommended cut-offs.

However, several single-item data and quotes from qualitative interviews indicated that interns face many wellbeing issues. However, these issues are sometimes overlooked by supervisors stating interns are not as resilient as the older generation, and on many occasions there wasn't any formal support or counselling mechanism. The MOH initiated during the pandemic a tele-counselling and psychological care hotline, though it was not identified by any interviewed interns as a source of support.

While the majority of interns were satisfied with the supervision received and the teams they work with according to the questionnaire survey, qualitative interview highlighted many challenging scenarios due to lack of supervision or poor supervision which is consistent with the findings in Chapter 3 that there is a shortage of consultants in these hospitals. The difference in quantitative and qualitative data could be due to response and central tendency bias of the survey data, "extreme cases" reported in interview data, or other reasons. Additionally, focus should be given to improving hospitals' safety climate. Many doctors did not know the proper channels to raise concerns about personal and patient safety, and many were uncertain about the no-blame culture in their hospitals. Fear that nothing would change, not wanting to be a fuss and having a negative effect on careers are common reasons for not speaking up about patient safety (199,200), especially for Kenyan interns who need their supervisors to sign their logbooks and in Kenya providing a "blame-free" environment is still not officially legalised and widely acknowledged by the workforce (201).

Interns reported poor working conditions, especially the lack of adequate resources such as medication, diagnostics and equipment. This is in line with the findings from the health

facility capacity assessment in Chapter 3. The lack of resources led to certain patients being referred to other hospitals thus interns not being able to acquire relevant skills, or interns forced to improvise threatening patient safety. The lack of suitable accommodation for interns, which is one requirement according to the national guideline (87), also posed challenges to their personal safety as interns move between home and hospitals and should be improved.

It's noteworthy that interns who worked in Level 4 small hospitals rated their wellbeing, supervision, working hours, patient safety as well as resource availability poorer. This again echoed our findings in Chapter 3 as well as previous qualitative work that suggested district hospitals are not suitable as internship sites as they provide limited learning opportunities and supervision (21). Our data also indicated that interns in these smaller hospitals are more likely to be overworked, for as long as 72 hours on call, as the general staffing of the hospitals is low. This would inevitably lead to burnout and other psychological problems.

Aside from improving resources availability and capacity of internship hospitals, my analyses highlight several other implications for Kenyan policy makers. More emphasis should be given to improving interns' wellbeing. Aside from the MOH's tele-counselling and psychological care hotline which wasn't mentioned by interns at all during the interview, regulators, educators and hospital administrators should improve interns' wellbeing from both a whole-system and individual levels. Regulators should also provide more training, support, recognition and rewards to supervisors and internship coordinators on how to better supervise and support interns as well as create a better

learning environment, especially in centres where psychiatry and community health rotations have not been formalised. Internship coordinators and other administrators should also further work on reducing work-place hierarchy and empowering interns, improving interprofessional teamwork, promoting active reporting culture not only to create a better learning environment but also to improve patient safety (202). These will be further discussed in Section 7.2.

While this study provided a more comprehensive description of the internship experience of junior doctors in Kenya through a mixed-methods approach, several limitations should be considered when interpreting these results. First, the questionnaire survey used a convenience and snowball sampling approach therefore it is not fully representative of the intern population. While the 358 responses came from all medical schools and 65 out of 74 internship hospitals, it is roughly 15% of all the eligible population. Despite this, I believe it still provided a good description of the internship population. Second, we included 131 current interns in our questionnaire survey and half of those interns are still in their first six months of internship, and their assessment might change as they further rotate into other specialties. We also included junior MOs who finished their internship in 2018 and 2019. Further analysis as shown in Appendix 13 did not identify patterns of differences between annual cohorts though there could be recall bias. Last but not least, as the questionnaire survey was part of the scale development and validation work, I have extensively revised the survey questions based on a careful and collaborative process with the target population and stakeholders as opposed to keeping the original tool items, especially tools like PSS and PHQ-9. Therefore, the original cut-offs and rating systems could not be used, and direct comparison with other studies is not achievable.

Also, since a main focus was scale development, the survey questions were much more narrowly focused on internship experience identified in the three major constructs and did not include broader issues like socio-political context. These adapted questions on their own, alongside qualitative data which was much broader in focus, provided a rich description of the internship experiences and highlighted challenges with interns' wellbeing.

Section 4C. Scale development and validation results in low- and middle-income countries

This section includes content from Zhao Y, Jalloh S, Lam PK, Kwarshak YK, Mbuthia D, Misago N, Namedre M, Phương NT, Qaloewa S, Summers R, Tang K.

Development and validation of a new measurement instrument to assess internship experience of medical doctors in low-income and middle-income countries. BMJ Global Health. 2023 Nov 1;8(11):e013399.

4C.1. Background

Findings from the scoping review in Section 4A suggested the relative lack of research on internship experiences in LMICs. As opposed to countries like the UK and the US where trainee surveys are administered annually (i.e. UK GMC National Training Survey (151) and the ACGME resident/fellow survey (153)), most LMICs do not have national trainee surveys that focus on the experience of internship training, and existing tools from high-income settings might not be relevant as there are significant differences in context: for example, infrastructure and physical resources availability (32) are commonly highlighted for LMICs but rarely for high-income settings.

Therefore, I aimed to develop and validate a tool, the “medical internship experience scale (MIES)”, focusing on the internship experience of medical doctors in LMICs. I worked with collaborators from Kenya and 8 other LMICs to develop MIES with the hope

that this tool could allow comparison between countries and across time to assess long-term trends or results of interventions/policy changes in the future. In this section, I combine the methods and results sections when presenting the scale development and validation as this is an iterative process. Also it should be noted that I am not analysing and comparing differences of internship experiences between countries in this chapter, as the arrangement was that country collaborators would analyse and publish these themselves. My primary focus was to use the cross-country data for scale development.

4C.2. Methods and results

I followed Boateng's 9-step scale development and validation framework for the development of MIES (Table 16 (115)). Collaborators from nine countries (Kenya, Uganda, Burundi, Sierra Leone, Nigeria, South Africa, Fiji, China and Vietnam, hereinafter referred to as "study countries") were involved in different stages of scale development and validation processes, with eight of them contributing to the final survey sample alongside an open survey capturing responses from other non-collaborator countries (Table 17). Work in study countries outside of Kenya was largely led by local collaborators identified from my and my supervisors' current and previous contacts. The nine study countries varied in geographic locations, income-level, and internship training models, which allowed me to understand and adapt my tool to fit a more general "LMIC" setting. Ethical approval information is provided in Section 2.11.

Table 16. Overview of MIES development and validation process

Step	Recommendation by Boateng et al. (115)	My approach
Phase 1: Item development		
Step 1: Identification of Domain and Item Generation: Selecting Which Items to Ask	- Domain identification and should be well-defined, good conceptual framework - Item generation, “question pool”. Inductive and deductive approach. Number of items should be at least twice the desired scale. Likert scale 5-7 response.	- Deductive approach, generated from a scoping review on existing tools that measure medical internship experience with additional questions added - 102 items all standardised to 5-point Likert scale
Step 2: Content Validity: Assessing if the Items Adequately Measure the Domain of Interest	- Evaluation by experts: Cohen’s coefficient kappa to measure expert agreement, or Delphi panel - Evaluation by target population	- For each individual country: discussion with 5-12 medical interns to understand whether the domains and items represent the actual experience from interns - For all country: joint expert panel (n=14) to evaluate item for content relevance, representativeness, technical quality
Phase 2: Scale development		
Step 3: Pre-testing Questions: Ensuring the Questions and Answers Are Meaningful	- Cognitive interview: modify, clarify the questions with 5-15 interviews in 2-3 rounds or saturation	- Translation into three additional languages (Mandarin Chinese, Vietnamese and French) - Cognitive interviews with 19 medical interns for face validity and ensure that the respondents understand items as I intended
Step 4: Survey Administration and Sample Size: Gathering Enough Data from the Right People	- Survey administration through Redcap or another tool - Sample size: best 10 participants for each item. Others suggest around 300 participants for factor analysis	- Online-based survey, paper-based survey or a mix, data entry into RedCap - A total of 1,646 complete responses were collected as of Jan 2023
Step 5: Item Reduction: Ensuring Your Scale Is Parsimonious	- Item response theory or classical test theory - Item difficulty index, item discrimination index, inter-item and inter-total correlations - Delete items that are not functional	- No item had an over 10% missing rate for the overall sample, missing data replaced by median due to data skewness and low-frequency - Classical test theory (CTT) to select items based on inter-item correlations. 6 items were further dropped due to low correlations
Step 6: Extraction of Factors: Exploring the Number of Latent Constructs that Fit Your Observed Data	- Exploratory factor analysis - Understand the latent structure - Delete factor loading below 0.30 and cross-loading	- Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy adequate (0.97) and Bartlett’s test significant for fitness of factor analysis - Exploratory factor analysis conducted on remaining factors, with six factors explaining 90% of variance and retained. Respectively, 6 and 32 items were removed due to high communality and cross-loading, leaving a final 50-item scale
Phase 3: Scale evaluation		
Step 7: Tests of Dimensionality: Testing if Latent Constructs Are as Hypothesised	- Important step but often missed - Re-test the structure on a different time or new sample - Independent cluster model – confirmatory factor analysis, bifactor modelling or measurement invariance	- Confirmatory factor analysis on the sample showed CFI is less than satisfactory while RMSEA and SRMR are satisfactory - Multigroup confirmatory factor analysis for measurement equivalence suggested that moderate configural invariance
Step 8: Tests of Reliability: Establishing if Responses Are Consistent When Repeated	- Cronbach’s alpha, or test-retest reliability	- Cronbach’s alpha for the overall final scale items was 0.95 and ranged from 0.74 to 0.93 for the six identified factors. The scale- and factor-specific alpha results were similar for most countries.

Step 9: Tests of Validity: Ensuring You Measure the Latent Dimension You Intended	- Criterion validity: concurrent or predictive - Construct validity: convergent, discriminant, known group, correlational analysis	- Examined the validity of MIES in line with Cook's recommendation including content validity, response process, internal structure, relations to other variables and consequences
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Table 17. Overview of the 9 study countries for MIES development and validation process

Country	Kenya	Uganda	Burundi	Sierra Leone	Nigeria	South Africa	Fiji	China	Vietnam
Income level (WB 2021)	LM	LIC	LIC	LIC	LM	UM	UM	UM	LM
Language version	English	English	French	English	English	English	English	Mandarin	Vietnamese
Site	Nationwide	Kampala, Lira	Bujumbura	Freetown, Makeni and Bo	Jos	N/A	Suva, Labasa, Lautoka	Beijing	Ho Chi Minh City
Survey mode	Online	Online	Paper	Paper	Online	N/A	Online	Online	Online
Local lead	Yingxi Zhao, Daniel Mbuthia	Raymond Tweheyo	Nadine Misago	Sulaiman Jalloh	Kevin Kwarshak	Kantharuben Naidoo, Reshania Naidoo	Sefanaia Qaloewai, Mesulame Namedre	Kun Tang	Lam Phung Khanh, Phuong Nguyen Thi Be, Bridget Wills
Local institution	KEMRI-Wellcome	Makerere University School of Public Health	Health Healing Network Burundi	Ola During Children's Hospital	Jos University Teaching Hospital	University of KwaZulu Natal	Fiji National University	Tsinghua University Vanke School of Public Health	University of Medicine and Pharmacy at Ho Chi Minh City
Local ethics	KEMRI	Makerere University School of Public Health, Higher Degrees and Ethics Research Committee	Ethics Committee, Faculty of Medicine, University of Burundi	Sierra Leone Medical and Ethics Review Committee	Jos University Teaching Hospital	N/A	Fiji National University	Tsinghua University School of Medicine Institutional Review Board	University of Medicine and Pharmacy at Ho Chi Minh City Ethics Committee in Biomedical Research
Participation in intern content validity discussion	X	X	X	X		X		X	X
Participation in cognitive interview	X	X	X (French)	X		X		X (Chinese)	X (Vietnamese)
Participation in cognitive interview	X	X	X	X	X		X	X	X
Complete response as of Jan 2023	358	487	120	96	90		42	160	177

Note: Additionally, an open survey was conducted to supplement the scale development process in non-study countries and a total of 113 samples were included in the final sample.

Step 1: Identification of Domains and Item Generation: Selecting Which Items to Ask

The first step of item development is to identify the domains and the items to be included in the scale. Through the scoping review of the tools that measure medical internship experience (Section 4A), I identified three major domains of interest: well-being, educational environment, and work conditions and environment.

For item generation, my item pool was identified using a deductive approach, i.e. reviewing existing tools and indicators from the scoping review. Five tools were selected (Patient Health Questionnaire-9 [PHQ-9], Perceived Stress Scale [PSS], Professional Quality of Life [ProQOL], Postgraduate Hospital Educational Environment Measure [PHEEM], and Safety Attitude Questionnaire [SAQ]) and permissions to use these tools were secured from relevant individuals and organisations. I also added additional questions that my supervisors and I believe were of relevance, with support for these from early findings of my research – for example, additional questions on physical resources and patient safety. A total of 102 items were included for MIES, with 3 additional screening questions and 4 socio-demographic questions. I provisionally categorised them into several sub-domains that might be stand-alone factors. Table 18 provides an overview of the domains, subdomains, item generation pool and the number of items.

I also standardised the questions and responses to ensure that they measure the broad internship experience and also are compatible within a survey. First, I changed the introductory paragraph and items to ask medical interns and junior doctors to reflect on

their whole internship period not specific to any specialty rotation, instead of “over the past two weeks” or “past month” such as in the PHQ-9 (203) and PSS (204). Second, some of the original scales have a four-point Likert scale and some others a five-point scale. To allow better response patterns and easier comparison, all the items were standardised into a five-point Likert scale, either “very often – often – sometimes – rarely - never” or “strongly agree – agree – neutral – disagree – strongly disagree”.

Table 18. Item generation, existing tools and number of items

Domain	Sub-domain	Item generation pool	Number of items
Well-being	Stress	Perceived stress scale	10
	Depression	Patient health questionnaire 9	9
	Burnout	Professional quality of life (ProQOL)	30
	Fatigue	ProQOL	
	Satisfaction	ProQOL	
Educational environment	Teaching and supervision	Postgraduate Hospital Educational Environment Measure (PHEEM)	40
	Organisational support	PHEEM	
Work condition and environment	Work condition	PHEEM	
	Physical resource	PHEEM + additional questions	2
	Safety culture	Safety Attitude Questionnaire (SAQ, safety domain only)	10
Total scale items			102
Non-scale items			
Screening (start)			3
Socio-demographic (end)			4

Step 2: Content Validity: Assessing if the Items Adequately Measure the Domain of Interest

Content validity refers to “the adequacy with which a measure assesses the domain of interest” (205) and specifies that items are relevant and representative (115). I followed Boateng et al.’s recommendation and assessed content validity through evaluation by the target population and by experts (115).

For target population evaluation, I led discussions in 7 countries with 5-12 medical interns each, a total of 43 interns, to understand whether the domains and items represented the actual internship experiences they had. These discussions were conducted online in English (except for China which is in a mix of Chinese and English) where I went through all the proposed items, asked them if they were relevant and probed for any other potential items or ideas. Items were revised and/or dropped at this stage leading to another version with 101 items (Appendix 14).

For expert panel validation, I led a joint expert-panel discussion involving 14 experts to evaluate items for content relevance, representativeness and technical quality. Experts were either clinicians with responsibility for training/supervision of interns, and/or researchers who have familiarity with survey/scale development processes (Appendix 15). These experts were selected purposefully, either the country local collaborators themselves if they were not involved in the previous steps, or recommended by collaborators, and came from 10 countries. I ran the expert panel discussion in English where I first introduced the MIES project and asked experts to rate all 101 items based on “whether this item is most relevant to capture the internship experience of the medical

doctors, across the broad domains of wellbeing, educational environment, work condition & environment” from 1 (not relevant), 2 (low relevance / needs major revision), 3 (medium relevance / needs minor alteration) to 4 (high relevance); Ratings were collected online using Microsoft Forms and there was a free-text column after each section where participants could provide comments and suggest revision of items.

I calculated two content validity indices: the item-level content validity index (I-CVI), which is the proportion of experts giving items a relevance of 3 or 4; and scale-level content validity index (S-CVI) based on the average method, which is the average of all the I-CVI scores for all items; and compared my results with the recommended values from Yusoff (206) and Lynn (207). The S-CVI was 86% which was satisfactory and above the 78% cut-off recommendation. 17 items had a below 78% I-CVI, of which 13 were dropped and 4 were revised. I also conducted some follow-up discussions with the group after the rating exercise and based on the discussion, I re-worded “clinical teacher” to “clinical supervisor”; and also added “during my internship” across items periodically to remind respondents that the items are asking about their internship experience. 88 items were retained after this step.

Step 3: Pre-testing Questions: Ensuring the Questions and Answers Are Meaningful

As the MIES tool was developed and validated in nine countries including countries where English is not the primary language used, the tool was translated into three additional languages (Mandarin Chinese, Vietnamese, and French). The translation processes followed WHO’s guideline for translation which includes forward- and back-translation (208), and were led by collaborators from China, Vietnam and Burundi, respectively. I

compared the back-translated version with the original scale items and discussed with the collaborators to ensure that the items were translated correctly.

I then conducted pre-testing to ensure that the items are meaningful to the target population and that the MIES survey could be successfully administered. Pre-testing was conducted in collaborators' proposed mode (online or paper) and in English or translated language and alongside cognitive interviews. Cognitive interviews most specifically focus on face validity and the wording of items, by asking the respondents to verbalise the mental process entailed in providing such answers, so as to ensure that respondents understand questions as I intended and that respondents are able to answer in a manner that reflects their experience (116,117). This is especially important for the non-English versions as there could be discrepancies during the translation process.

I led all the English pre-testing and cognitive interviews in Kenya, Uganda and South Africa and the Mandarin Chinese pre-testing and cognitive interview in China, all conducted online; collaborators from Vietnam and Burundi, after training and discussion with me, conducted respective pre-testing and cognitive interviews in their country, both conducted in person. A total of 19 medical interns were included in cognitive interviews, and the interviews were conducted using a mix of "think aloud" (tell me what you are thinking as you answer this question) and "probing" (what this term X means to you and why you chose that answer). Items were further revised and rephrased at this phase.

Step 4: Survey Administration and Sample Size: Gathering Enough Data from the Right People

The final sample used for analysis was collected from eight study countries including Kenya, Uganda, Burundi, Nigeria, Sierra Leone, Fiji, Vietnam and China as well as an open survey. Survey administration and collection were mostly driven by myself in Kenya and other country collaborators in their respective country.

The study population eligible for the MIES survey are the current cohort of medical interns and junior medical officers who finished internships in 2018 or after. A variety of rules have been suggested for determining the sample size for the questionnaire survey and scale development: (1) Nunnally suggested for scale development the rule of thumb is 10 participants per item (115,209); (2) Guadagnoli suggested that the actual number is dependent on the number of items per scale construct and component saturation (the magnitude of component loading), and if there are 10 or more items representing each construct, a sample size of 150 observations should be sufficient to obtain an accurate solution (210). Considering I have 88 items and 3 initial domains/constructs, I sought to survey at least 150 participants per study country and a total of 1,000 participants due to sample size consideration.

Participants were identified using a mix of snowballing and purposive sampling approaches: for example in China, I and the study collaborator advertised the survey through social media only, and in Uganda and Burundi, the study collaborators visited hospitals where medical interns and junior medical doctors are based and invited them to participate. A filtering question was also included in the survey to ensure participants'

eligibility. The survey was self-administered by participants either online (through REDCap, Microsoft Forms or Wenjuanxing [a tool commonly used in China]) or using paper-based questionnaires. Response was considered incomplete and dropped if more than 10% of the scale items were missing – and in our case 77 individuals were dropped.

As of Jan 2023, a total of 1646 complete responses were collected, out of which 113 samples were collected from non-study countries through the open survey, notably South Africa and Tanzania. Only Kenya, Uganda, Vietnam and China had over 150 complete responses (Table 19).

Table 19. MIES final survey sample

Country	Complete response	Percentage as of total sample	Missing 10% of items (dropped sample)
Uganda	487	29.59	10
Kenya	358	21.75	2
Vietnam	177	10.75	2
China	160	9.72	7
Burundi	120	7.29	46
Sierra Leone	98	5.95	3
Nigeria	90	5.47	5
Fiji	42	2.55	2
South Africa	39	2.37	N/A
Tanzania	25	1.52	N/A
Ghana	17	1.03	N/A
Philippines	9	0.55	N/A
Bangladesh	6	0.36	N/A
Namibia	4	0.24	N/A
Belize	3	0.18	N/A
Malawi	3	0.18	N/A
Benin	2	0.12	N/A
Ethiopia	2	0.12	N/A
Gambia, The	1	0.06	N/A
India	1	0.06	N/A

Indonesia	1	0.06	N/A
Mozambique	1	0.06	N/A
Total	1,646		

Step 5: Item Reduction: Ensuring Your Scale Is Parsimonious

I first further explored the level of missingness for each item included in the scale. I calculated how many respondents selected “don’t know/prefer not to say” among all responses for each item. According to Appendix 16 , no item had an over 10% missing rate for the overall sample though for some items there were slightly higher missing rates in countries with small sample sizes. For the rest of the items, I have replaced the missing values with the median of each item. There are different ways to handle missing data in scale development including mean replacement and multiple imputation (115). I used median instead of mean because most of the items are skewed and mean replacement is valid only if the data is normally distributed; and given the small nature of missing data in my case (all but one items have less than 3% missing rate) I did not use more advanced imputation approaches (211,212).

The objective for item reduction analysis is to ensure that only functional and internally consistent items are included, and I used inter-item and item-total correlations as a technique under the classical test theory (CTT) to select my items. Inter-item correlations measure the extent to which the score of one item is related to scores on all other items, suggesting the extent to which they measure the same construct. Using a cutoff of 0.3, six items (Q6, Q17, Q54, Q56, Q67, Q71) were further dropped as they have very low correlations (see Table 21).

Step 6: Extraction of Factors: Exploring the Number of Latent Constructs that Fit Your Observed Data

The next step of the scale development process focused on extracting factors and domains of the scale, and I used factor analysis to understand the latent structure of the items. I first calculated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to evaluate the fitness of data for factor analysis, and ran Bartlett's test for the correlation matrix. A KMO measure between 0.8-1.0 is considered adequate and for the remaining MIES items the KMO measure was 0.97, and Bartlett's test was statistically significant.

The next step is to identify the number of factors or constructs, and there have been a number of different methods to determine the number including scree plots, the variance explained by the factor model and the factor loading pattern (115). I conducted exploratory factor analysis on the remaining 82 MIES items, six factors had Eigen values exceeding one, explaining 53%, 15%, 10%, 5%, 3% and 3% of the variance respectively (Table 20). An inspection of the Scree plot however, revealed a likely break after the third factor (Figure 13). While there is no absolute correct answer in terms of the number of factors that should be selected, I decided to retain the six-factor solution due to the slightly shorter number of items retained and more intuitive structure. The three-factor-solution was also explored in the next steps though it did not significantly out-performed the six-factor solution (Appendix 17 and Appendix 18), and I further discuss the justification of retaining the six-factor solution in Section 4C.3.

Table 20. Eigen values for MIES items and retained factors

Factor	Eigen value	Difference	Proportion	Cumulative
Factor1	22.53481	16.01009	0.5319	0.5319

Factor2	6.52472	2.08584	0.1540	0.6859
Factor3	4.43888	2.43607	0.1048	0.7907
Factor4	2.00281	0.54443	0.0473	0.8380
Factor5	1.45838	0.32703	0.0344	0.8724
Factor6	1.13135	0.26705	0.0267	0.8991
Factor7	0.86429	0.02627	0.0204	0.9195
Factor8	0.83802	0.10349	0.0198	0.9393
Factor9	0.73453	0.08261	0.0173	0.9566
Factor10	0.65193	0.09885	0.0154	0.9720

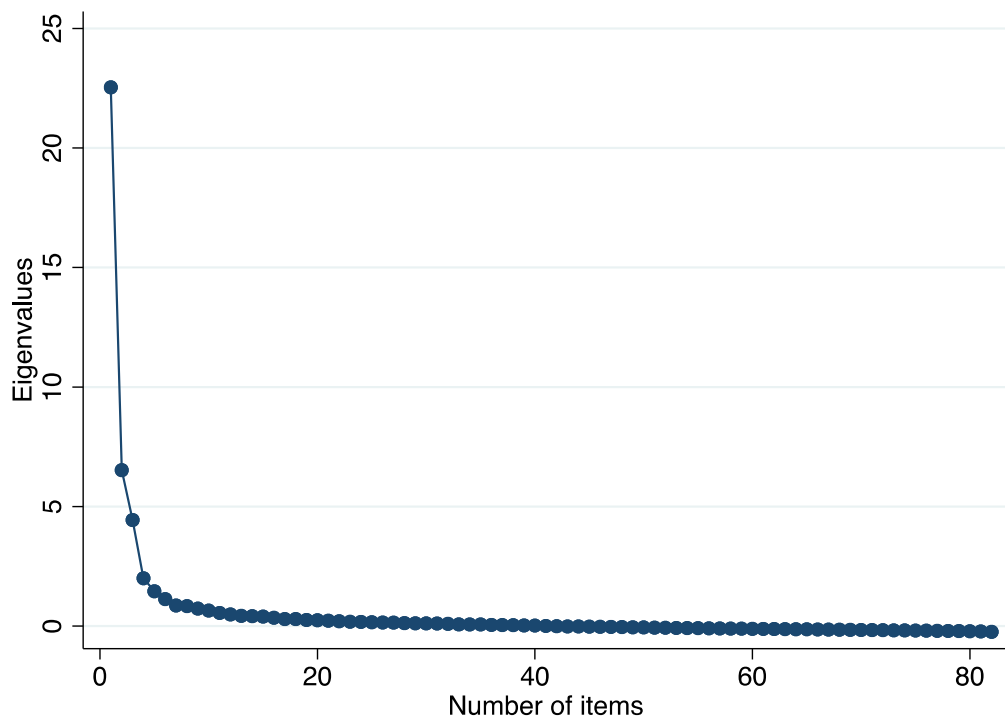


Figure 13. Scree plot for exploratory factor analysis

After restricting the remaining items to a six-factor structure, I further removed items with high communality (>0.80) and items with cross-loading – for the latter I used the 0.4/0.3/0.2 rule, which is items should satisfy (a) load onto their primary factor above 0.40, (b) load onto alternative factors below 0.30, and (c) demonstrate a difference of 0.20 between their primary and alternative factor loadings) (213,214). This removed 32 items across three rounds of testing (Table 21).

In summary, I have identified a six-factor structure for the MIES scale with a total of 50 retained items. After reading the items, I named the six factors (1) clinical learning and supervision; (2) patient safety; (3) stress and burnout; (4) job satisfaction; (5) mental wellbeing; and (6) fairness and discrimination, respectively. Final items and their corresponding factor loading as well as sources are presented in Table 22.

Table 21. Rationale and evidence for dropping MIES items across Step 5 and 6

Step	No.	Item	Rationale
Step 5: Item reduction	Q6	I am able to control irritations in my work and life during my internship.	Low item-rest correlation (0.29)
	Q17	I get satisfaction from being able to help people.	Low item-rest correlation (0.26)
	Q54	I am pre-occupied with administrative work that impeded my ability to learn.	Low item-rest correlation (0.12)
	Q56	There is an informative and comprehensive internship guideline, log book or clinical diary.	Low item-rest correlation (0.27)
	Q67	I am beeped or called concerning the patients inappropriately during my internship.	Low item-rest correlation (0.30)
	Q71	There is a no-blame culture in my internship hospital.	Low item-rest correlation (0.27)
Step 6: Extraction of factors (Round 1)	Q52	My internship training makes me feel ready to be an independent medical practitioner.	Cross-loading (0.58 on factor 1, 0.32 on factor 3)
	Q62	I have suitable access to careers advice services or advisors during my internship.	Cross-loading (0.38 on factor 1, 0.33 on factor 2)
	Q61	I have good collaboration with other medical practitioners, interns and clinical staff.	Cross-loading (0.37 on factor 1, 0.23 on factor 3)
	Q57	I have the appropriate level of responsibility as a medical intern.	Cross-loading (0.34 on factor 1, 0.20 on factor 2)
	Q55	I had an informative internship induction programme.	Cross-loading (0.33 on factor 1, 0.23 on factor 2)
	Q60	I have the opportunity to provide continuity of care for patients during my internship.	Cross-loading (0.31 on factor 1, 0.29 on factor 2)
	Q65	My work hours are appropriate during my internship.	Cross-loading (0.56 on factor 2, 0.34 on factor 4)
	Q66	My workload is reasonable during my internship.	Cross-loading (0.53 on factor 2, 0.39 on factor 4)
	Q80	I feel physically safe within my internship hospital.	Cross-loading (0.38 on factor 2, 0.18 on factor 5)
	Q40	Time for my own reading, training and education is allocated by the hospital during my internship.	Cross-loading (0.34 on factor 2, 0.22 on factor 1 and 4)
	Q3	I feel confident about my ability to handle my personal problems during my internship.	Cross-loading (0.36 on factor 3, 0.23 on factor 4)
	Q34	I have been affected by the hardship and stress experienced by those patients I help.	Cross-loading (0.61 on factor 4, 0.47 on factor 6)
	Q35	I have felt on edge about various things because of my work helping patients.	Cross-loading (0.59 on factor 4, 0.45 on factor 6)
	Q27	I am not as productive at work because I am losing sleep over work-related traumatic experiences.	Cross-loading (0.45 on factor 4, 0.33 on factor 6)
	Q4	I have felt that things have not gone my way in my life.	Cross-loading (0.45 on factor 4, 0.25 on factor 3)
	Q79	I feel emotionally vulnerable within my internship hospital environment.	Cross-loading (0.41 on factor 5, 0.32 on factor 4)

	Q36	I avoid certain activities or situations because they remind me of frightening experiences of the patients I help.	Cross-loading (0.59 on factor 6, 0.41 on factor 4)
	Q16	I have the thoughts that I would be better off dead or of hurting myself in some way.	Cross-loading (0.37 on factor 6, 0.26 on factor 4)
Step 6: Extraction of factors (Round 2)	Q58	I feel part of a team working here.	Cross-loading (0.43 on factor 1, 0.45 on factor 6)
	Q88	The internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need.	Cross-loading (0.48 on factor 2, 0.48 on factor 6)
	Q75	It is difficult to discuss medical errors in my internship hospital.	Cross-loading (0.37 on factor 2, 0.30 on factor 5)
	Q37	As a result of my helping, I have intrusive, frightening thoughts.	Cross-loading (0.37 on factor 3, 0.22 on factor 6)
	Q18	I feel invigorated and energised after work during my internship.	Cross-loading (0.36 on factor 4, 0.25 on factor 3)
	Q7	I feel that I am on top of things at work.	Cross-loading (0.34 on factor 4, 0.20 on factor 3)
	Q86	There are adequate catering services provided by the internship hospital when I am on call.	Cross-loading (0.55 on factor 6, 0.34 on factor 2)
	Q87	The internship hospital has good internet connection for my study and work need.	Cross-loading (0.48 on factor 6, 0.33 on factor 2)
	Q85	The internship hospital has good quality accommodation for me when on call.	Cross-loading (0.46 on factor 6, 0.29 on factor 2)
	Q63	There are good counselling opportunities for medical interns who fail to complete their training satisfactorily.	Cross-loading (0.32 on factor 6, 0.24 on factor 1)
	Q64	I have a contract of employment or other document that provides information about hours of work during my internship.	Cross-loading (0.315 on factor 6, 0.26 on factor 2)
Step 6: Extraction of factors (Round 3)	Q9	I feel that difficulties at work are piling up so high that I could not overcome them.	Cross-loading (0.39 on factor 3, 0.28 on factor 5)
	Q19	I like my work as a medical intern.	Cross-loading (0.6 on factor 4, 0.32 on factor 3)
	Q13	I feel tired or having little energy during my internship.	Cross-loading (0.44 on factor 5, 0.39 on factor 3)

Table 22. Final items included for the MIES scale

Factor	Question	Item loading	Adapted or new
Factor 1 – Clinical learning and supervision (n=14) (Cronbach's alpha: 0.93)	My clinical supervisors are enthusiastic about teaching and supervision.	0.93	PHEEM
	The clinical supervisors provide me with regular feedback.	0.90	
	My clinical supervisors are accessible for teaching and supervision.	0.89	
	My clinical supervisors have good mentoring skills.	0.88	
	The clinical supervisors provide me with feedback on my strengths and weaknesses to ensure my professional development.	0.75	
	My clinical supervisors have good communication skills.	0.74	
	I have enough clinical learning opportunities for my needs during the internship period.	0.68	
	I have good clinical supervision at all times during my internship.	0.67	
	My clinical supervisors encourage me to be an independent learner.	0.63	
	My clinical supervisors have set clear expectations.	0.61	
	I am able to participate actively in educational sessions (e.g. continuing medical educations) during my internship.	0.59	
	I have opportunities to acquire the appropriate practical procedures for clinical practice during my internship.	0.58	
	I have access to educational sessions and programmes that are relevant to my needs during my internship.	0.58	
	My clinical supervisors promote an atmosphere of mutual respect.	0.55	
Factor 2 – Patient safety (n=10) (Cronbach's alpha: 0.90)	There are clear and updated patient safety protocols in the internship hospital.	0.81	New
	Medical errors are handled appropriately in my internship hospital.	0.73	SAQ
	I know the proper channels to direct questions regarding patient safety.	0.72	
	I am encouraged by my colleagues to report any patient safety concerns I may have.	0.70	
	The culture in my internship hospital makes it easy to learn from the errors of others.	0.69	
	I would feel safe being treated as a patient in my internship hospital.	0.68	
	I know the proper channels to direct questions regarding my own safety.	0.65	New
	There are adequate infection prevention and control measures.	0.63	New
	I can report any concern and receive responsive feedback in my internship hospital.	0.63	New
	There are clear clinical protocols and guidelines across all departments in the internship hospital.	0.46	PHEEM
Factor 3 – Stress and burnout (n=10) (Cronbach's alpha: 0.90)	I feel overwhelmed because my case workload seems endless during the internship.	0.97	ProQOL
	I feel worn out because of my work as a medical intern.	0.91	
	I feel trapped by my job as a medical intern.	0.71	
	I feel bogged down and held back by the internship hospital.	0.68	
	I am preoccupied by concerns about multiple patients during my internship.	0.67	
	I find it difficult to separate my personal life from my life as a medical intern.	0.63	PSS
	I feel that I am unable to balance my work and personal life during my internship.	0.63	
	I feel nervous and/or stressed because of my internship work.	0.63	
	I find that I could not cope with all the work that I had to do during my internship.	0.45	

	I am angered because of things that were outside of my control.	0.40	
Factor 4 – Job satisfaction (n=7) (Cronbach's alpha: 0.88)	I am proud of what I can do to help as a medical intern.	0.93	ProQOL
	I believe I can make a difference through my work.	0.88	
	I believe that I am a success as a medical intern.	0.81	
	I am happy that I chose to do this work.	0.79	
	My internship work makes me feel satisfied.	0.73	
	My ability to keep up with clinical techniques and protocols makes me feel pleased.	0.64	
	My internship experience met my expectation.	0.48	New
Factor 5 – Mental wellbeing (n=5) (Cronbach's alpha: 0.84)	I have eating problems, either have poor appetite, or have been overeating.	0.82	PHQ-9
	I have sleeping problems, either have trouble falling or staying asleep, or sleeping too much.	0.76	
	I have trouble concentrating on things either work-related, or outside of my work.	0.66	
	I have little interest or pleasure in doing things that I used to enjoy.	0.63	
	I feel down, depressed, or hopeless because of my internship work.	0.59	
Factor 6 – Fairness and discrimination (n=4) (Cronbach's alpha: 0.74)	There is gender discrimination in my internship hospital.	0.73	PHEEM
	There are other forms of discrimination (e.g. ethnicity, religion, tribe, disability) in my internship hospital.	0.73	New
	I get bullied or victimised within my internship hospital.	0.47	New
	I have to perform inappropriate tasks during my internship.	0.44	PHEEM

Step 7: Tests of Dimensionality: Testing if Latent Constructs Are as Hypothesised

I then moved on to examining dimensionality, i.e. to see whether the six-factor-structure is the same across two independent samples, within the same sample at different points or across groups. Due to our sample size I am unable to test it in a different sample, thus I primarily focused on measurement invariance, which is whether the psychometric properties are generalizable across different sub-groups – in our case across different countries.

The first step before testing measurement invariance is running the confirmatory factor analysis on the overall sample again and in each individual country. Table 23 shows the result of the confirmatory factor analysis. Comparative fit index (CFI) measures “the relative improvement in the fit of a researcher’s model over that of a baseline model” and ideally should be over 0.95 or 0.90 in a relaxed fit; Root mean square error of approximation (RMSEA) measures “the difference between the examined model and a hypothetical model where every component in the model is related to every other component” and should be below 0.06 or 0.08 in a relaxed fit; Standard root mean square residual (SRMR) is a measure of “the mean absolute correlation residual, the overall difference between the observed and predicted correlations” and also should be below 0.08 or 0.10 in a relaxed fit (115). As shown in Table 23, the overall sample CFI was less than satisfactory while RMSEA and SRMR were satisfactory. The results were similar for the four countries with over 150 respondents’ sample sizes.

I further tested the measurement equivalence using multigroup confirmatory factor analysis (Table 24). There are three types of measurement invariance, i.e. configural

invariance (same number of factors and pattern of loading), metric invariance (factor loading across groups), scalar invariance (same item intercepts). Due to the less than ideal CFI in the overall sample as examined in the previous step, our model fitted moderately for configural invariance (CFI = 0.86). This suggests some differences in terms of factor loading across different countries. This could be due to various reasons including adequate but still small sample size, cross-loading of items, or others. Nonetheless, this suggests that comparing the results such as aggregate scores across different countries requires extra caution as the scales might perform slightly differently in each country.

Table 23. MIES confirmatory factor analysis result and reliability test

Country	RMSEA (≤0.06 or 0.08)	CFI (≥0.95 or 0.90)	SRMR (≤0.08 or 0.10)	Cronbach's alpha (>0.80)	Cronbach's alpha for factor 1	Cronbach's alpha for factor 2	Cronbach's alpha for factor 3	Cronbach's alpha for factor 4	Cronbach's alpha for factor 5	Cronbach's alpha for factor 6
Overall	0.049	0.893	0.054	0.95	0.93	0.90	0.90	0.88	0.84	0.74
Multigroup	0.067	0.809	0.086	0.96	0.93	0.91	0.91	0.90	0.85	0.77
Kenya	0.057	0.886	0.063	0.97	0.94	0.93	0.90	0.91	0.88	0.78
Uganda	0.053	0.864	0.062	0.94	0.91	0.89	0.90	0.86	0.82	0.71
Vietnam	0.074	0.801	0.075	0.95	0.95	0.84	0.86	0.91	0.82	0.86
China	0.069	0.831	0.072	0.95	0.95	0.88	0.89	0.91	0.84	0.80

Table 24. MIES multigroup measurement invariance analysis

	χ^2	df	CFI	RMSEA	Comparison	Δ CFI	Δ RMSEA
Unconstrained (configural invariance)	531.733	150	0.856	0.060			
Measurement weights (metric invariance)	356.845	132	0.849	0.061	2 vs 1	0.007	0.001
Structural covariance (scalar invariance)	732.637	131	0.794	0.070	3 vs 2	0.055	0.009

Step 8: Tests of Reliability: Establishing if Responses Are Consistent When Repeated

I calculated Cronbach's alpha to assess the internal consistency of the scale items, which is one commonly used reliability criteria. As shown in Table 23, Cronbach's alpha for the overall final scale items was 0.95 and ranged from 0.74 to 0.93 for the six identified factors. The scale- and factor-specific alpha results were similar for most countries. Due to data limitations, I was unable to examine the test-retest reliability.

Step 9: Tests of Validity: Ensuring You Measure the Latent Dimension You Intended

I examined the validity of MIES in line with Cook's recommendation, which defined validity as "the degree to which a score can be interpreted as representing the intended underlying construct" that incorporated five different aspects, i.e. content validity, response process, internal structure, relations to other variables and consequences (215).

Content validity of MIES was ensured as the item development process included a scoping review to identify relevant tools, as well as content validity discussions with both the target population and an expert panel. Response process refers to how well the respondents' response aligns with the intended construct, and in my case I used cognitive interviews as part of pilot testing to ensure that respondents understand the items as I designed. Evidence on the internal structure of the scale derived from internal consistency and factor structure analysis; I do not yet have evidence on relations to other variables and consequences for the MIES scale, though the 6 domains identified echoed qualitative evidence from Section 4B which highlight the important and challenging issues for internship training, and the tool could be used in the future to identify hospitals that

trained interns with poorer internship experience and further improve internship training environment.

4C.3. Summary and discussion

In summary, I presented the development and validation of a scale to measure the internship experience of medical doctors in LMICs. It tested for reliability, factorial structure and validity across four languages and more than eight different countries varying in internship training contexts. 50 items that comprise the scale broadly covered six major constructs, i.e. clinical learning and supervision, patient safety, stress and burnout, job satisfaction, mental wellbeing, and fairness and discrimination.

The scale developed is built upon several existing tools such as PHEEM (166), PSS (204) and ProQOL (216). However, as these existing tools include items not specific to internship training and/or not relevant to LMICs settings (217), I extensively reviewed and revised items through content validity discussions with junior medical doctors in LMICs, expert panel and cognitive interviews, to ensure that all items are relevant to capture the internship experiences of medical doctors in LMICs.

One important aspect of the MIES tool is that it provides an empirically sound tool to compare internship experiences across facilities and time, and identify opportunities for improving internship experiences. Governments, medical schools and medical councils could use this tool to compare internship experiences across different training facilities and to identify areas where improvements are needed. As an example, by calculating and comparing the aggregate score of the six factors for the Kenyan sample which is a

recommended analytical approach for scales (194), we found that there is a statistically significant difference in interns' experience of patient safety for Level 4 small facilities (mean 2.98 out of 5), Level 4 large facilities (3.10) and Level 5 & 6 facilities (3.34) using parametrics tests, as well as significant difference in job satisfaction (3.74 vs. 4.01 vs. 3.98). Additionally, female respondents rated their mental wellbeing significantly lower than male respondents (3.00 vs. 3.43). There was no statistically significant difference between different graduating cohorts. These findings highlighted that interns who work in Level 4 small hospitals had poorer experiences as opposed to others who interned in larger hospitals, in line with findings from Chapter 3 (health facility capacity) and Section 4B (qualitative data), therefore smaller hospitals require additional improvement and support to ensure that interns receive similar experience across different facilities. Additionally, improving wellbeing for interns is urgently needed, especially for female interns, and further qualitative work is needed to understand the reason of poorer wellbeing for female interns and what systematic support could be provided. The tool could be used to track changes in internship experiences over time if administered as an internship exit survey annually.

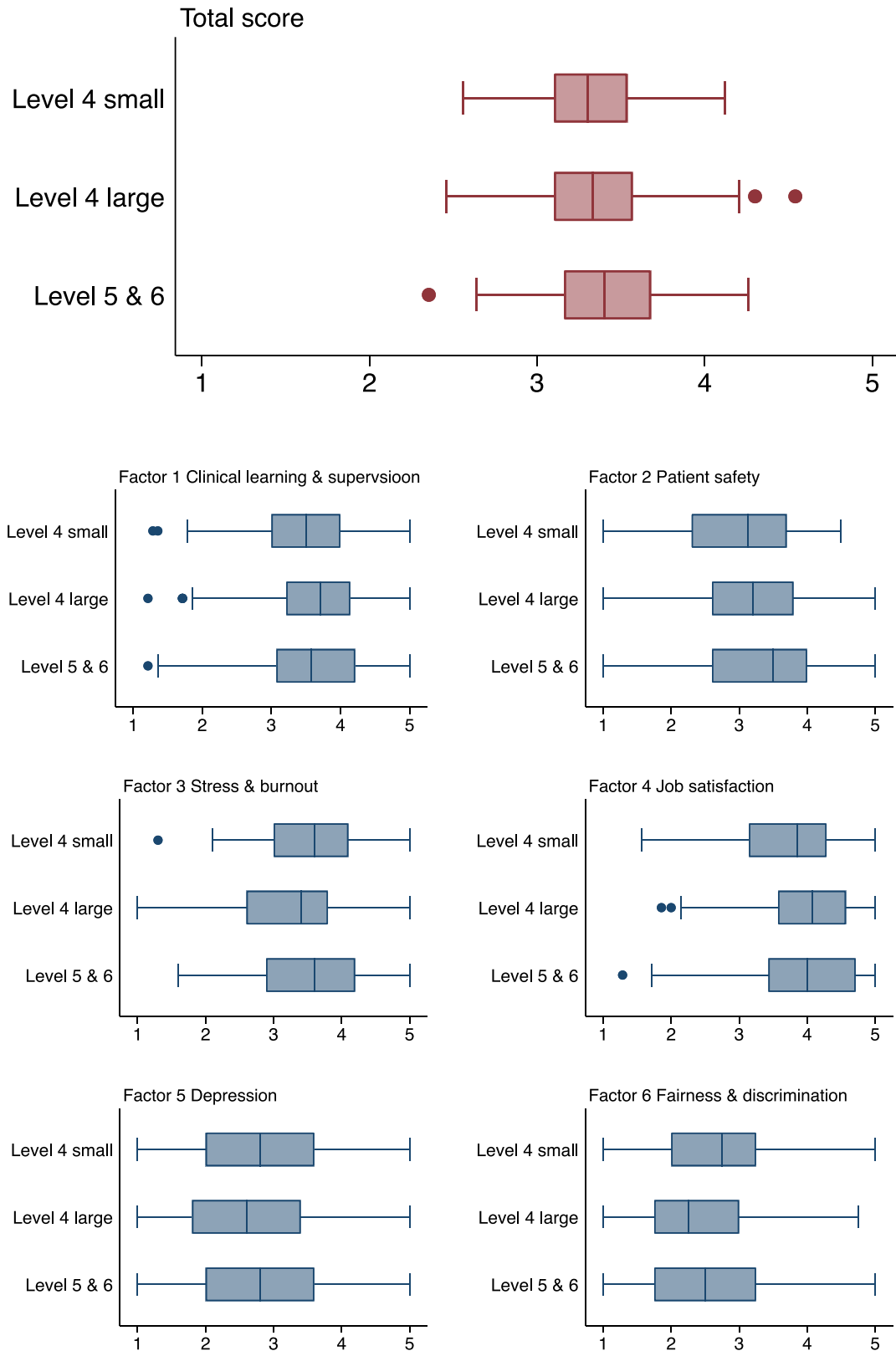


Figure 14. Comparison of MIES aggregate scores between different level facilities

Note: Comparison of individuals interned in different facilities. 99 participants interned in level 4 small facilities (bed number < 196), 98 interned in level 4 large facilities (bed number ≥ 196), 137 interned in level 5 & 6 facilities, and 24 interned in other types of

facilities which is not shown here. All “negative” items have been reversed and higher score in each factor is more favourable.

It should be noted that I opted for a six-factor structure for MIES instead of using three factors. Both versions have their pros and cons as they performed similarly in subsequent dimensionality and reliability testing. While both versions had a slightly poor model fit, this is common in studies running confirmatory and exploratory factor analysis in the same sample (218). The six-factor version has 50 items, which is shorter despite having more domains therefore easier for implementation and intuitive for actions. The 3-factor version has 65 items and would include some important items related to resources availability, however it has lumping of many items in very large domains. Amongst the resource related items, such as Q88 (the internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need) and Q85 (the internship hospital has good quality accommodation for me when on call), responses were more negative from African respondents. Respondents from Vietnam and China did not report challenges with them and these items cross-loaded onto more than one factor in the six-domain scale and thus were dropped. Nonetheless, I have included the original 88-item version (Appendix 4), 6-factor / 50-item version (Table 22) and the 3-factor / 65-item version (Appendix 18) in appendices. Future studies could select the version most relevant to their need, for example if the aim is for cross-setting comparison then the 6-factor / 50-item version (Table 22) is most suitable, and for countries designing their national internship survey they could further add in questions of specific concern from the original 88-item version (Appendix 4) such as questions on resources availability and even questions on remuneration and career intentions as stand alone issues.

Additionally, I also recommend further work to explore and report on the scale structure to improve the scale itself.

Strengths of this study include the diversity of study countries and regions and the use of best practices for scale development. One key limitation is the measurement equivalence of the scale across different countries. According to the confirmatory factor analysis and the multigroup confirmatory factor analysis, configural invariance is less than ideal suggesting that the factor number and loading pattern could be slightly different in different countries. This means that some items might not load onto certain factors in the same way across these countries. This could be due to various reasons including relatively small sample sizes and cross-loading of items. While I have conducted content validity discussions and cognitive interviews in different countries to ensure that items are understood similarly across settings, some items might have been interpreted differently by participants in different countries. Therefore, comparing the results such as aggregate scores across different countries requires caution.

Section 4D. Chapter summary

In this chapter, I further explored the internship training experiences of Kenyan doctors and doctors in other LMICs. I surveyed 358 Kenyan MOs and interns and also interviewed 40 MOs and consultants. Findings highlighted the challenging working environment such as lack of adequate resources (echoing findings from Chapter 3), unreasonable working hours that led to burnout and wellbeing problems. More discussions on strategies to improve the internship training experiences is provided in Section 7.2. I also developed

and validated a MIES for LMICs with collaborators from 9 study countries and a total survey sample of 1,646. It provides an empirically sound tool to compare internship experiences across facilities and time and could be used to pinpoint areas for improvement, especially surrounding clinical learning and supervision, patient safety, stress and burnout, job satisfaction, mental wellbeing, and fairness and discrimination.

Chapter 5. Understanding career intention after internship

Data from Chapter 4 highlighted the internship experiences of junior medical doctors in Kenya including feeling satisfied about their jobs, though suffering from wellbeing problems, working unreasonable hours due to staff shortages as well as coping with challenging working environments such as lack of adequate resources and poor safety climate. Besides harming health and wellbeing of individuals, poor internship experience can also impact doctors' career pathways, especially at their labour market entrance stage. In this chapter, I aimed to understand how internship experiences influence medical doctors' career intentions, drawing from the global literature and Kenyan data. Section 5A describes the results from the meta-ethnography review, and Section 5B further tests out the conceptual framework developed from the review, using qualitative interview data collected from Kenyan MOs and consultants.

Section 5A. Meta-ethnography review results and framework

This section includes content from Zhao Y, Mbutia D, Blacklock C, Gathara D, Nicodemo C, Molyneux S, English M. *How do foundation year and internship experience shape doctors' career intentions and decisions? A meta-ethnography. Medical Teacher. 2023 Jan 2;45(1):97-110.*

5A.1. Introduction

Internship years appear to be an important time in career decision making as this is closer to when most apply for specialty training programme or their first job (34). Experiences gained during the internship are likely to inform newly qualified doctors' opinions about how they want to continue their career, including in which specialty, organisation or even country (34). In the UK, the proportion of foundation doctors intending to pursue specialty training immediately after FY2 (the 2nd year of the foundation programme) declined from 71.3% in 2011 to 35.5% in 2019. Instead, many took up service roles in the NHS prior to committing to further training, or chose to take a break (38). Aside from not being accepted by their preferred specialty or location, common reasons for doctors taking a break were the need to prevent or recover from burnout, uncertainty about career direction, feeling pressured to commit to a long training programme, and dissatisfaction with training environments (38). Importantly, 11% of FY2 trainees expressed an intention to work outside of the UK temporarily or permanently, 7% intended to take a career break and 1% to leave medicine permanently (38). Such delays or exits can have a negative impact on service delivery and workforce planning (219). These challenges are not unique to the UK (37), and for LMICs there are also substantial exits from public health systems and migration to high-income countries (42,43,220,221).

Previous systematic reviews and evidence syntheses have summarised a broad list of factors that influence medical doctors' career intentions and decision-making in relation to specialty choice (34,222,223), retention in the public sector (224), in rural and under-developed areas (225,226) and migration (227). While these reviews provide an overview of factors influencing career decisions across a range of contexts, there has been no in-

depth investigation of how experiences during internship influence doctors' ongoing career decisions. The closest is a review by Stagg et al. (2012) which suggested that positive role models during clinical rotations could change students' career choices towards rural practice and primary care, whereas negative influences such as surgical supervisors' disrespect to colleagues and poor teaching could "turn off" students from pursuing a surgical career (228). Understanding the link between internship experience and ongoing career decisions is important for workforce planning, as this is a key time point to retain and direct the workforce where it is most needed. The internship period is also arguably amenable to change through action by health facilities, medical regulators, educators and policymakers.

In this review, I aimed to understand how this critical period of internship training shaped junior doctors' career decision-making. The findings can inform medical regulators and educators, hospital administrators, and policymakers on factors to consider in strengthening internship training and career advice, especially when trying to attract junior doctors to less popular specialties and work locations.

5A.2. Materials and methods

There are different methods for qualitative evidence synthesis. I chose meta-ethnography, a theory-generating, interpretive methodology for qualitative evidence synthesis as I hoped to develop conceptual understanding through a process of constant comparison of concepts and metaphors, rather than to simply aggregate findings (119,120). I followed the 7-stage meta-ethnography approach developed by Noblit and

Hare for the synthesis process (119). The stage-by-stage documentation of my synthesis is provided in Appendix 19.

Search strategy and screening

With assistance from a specialist medical librarian, I conducted a systematic search using MEDLINE, Embase, Global Health, PsycINFO, Science Citation Index Expanded and Social Sciences Citation Index to identify relevant articles. I combined terms and phrases related to foundation doctors, interns, junior doctors, career choices (such as general terms, specialty choices, migration, rural, public or private sector) and qualitative studies filters (229). I included papers published between 2000 and 2020 in English, and for mixed-methods studies focused only on the qualitative components. The search strategy is provided in Appendix 19.

I adopted a broad definition of “career intention and decisions”, including but not limited to migration, public/private/dual practice preference, rural/urban preference, and clinical specialty. To meet “foundation year or internship experience” criteria for inclusion, papers had to focus on how doctors’ experience during foundation years or internship impacted their career intention and decisions. I defined internship as the period after primary medical qualification where doctors work in accredited positions in hospital settings to gain supervised experience, in line with my previous scoping review (Box 2).

After de-duplication, I and another reviewer (Daniel Mbutia, DM) conducted two stages of independent screening (title and abstract, and full-text) and assessed selected papers for quality and relevance using two methods: (1) the Critical Appraisal Skills Programme

(CASP) which includes 10 appraisal questions spanning recruitment strategy to ethical issues, and (2) the global categorisation, described by Dixon-Woods et al (230) (231) which focuses on the “richness” of the findings and their contribution to the synthesis. The global categorisation includes four categories: “key paper” (conceptually rich and could potentially make an important contribution to the synthesis), “satisfactory paper”, “irrelevant” to the synthesis, and methodologically “fatally flawed” (e.g. unclear study design and data source). “Irrelevant” and “fatally flawed” papers were excluded. I resolved disagreements on inclusion at all stages by discussion among the two reviewers.

“Translation” and synthesis

I and DM first used NVivo software (version 1.4) to facilitate close reading and extraction and comparison of concepts from each selected paper. Contextual information of all included papers was first extracted and all papers were read thoroughly by myself and DM. For further extraction I extracted first-order constructs (participants’ common-sense interpretation in their own words) and second-order constructs (researchers’ interpretation based on first-order constructs), and used both to develop third-order constructs (reviewers’ interpretation of original authors’ interpretation) (232,233), as there were studies that did not primarily focus on linking internship experience and career outcomes but had relevant quotations and data supporting that link.

To identify initial constructs, four key papers were selected based on their richness and career outcomes examined. These were examined independently to identify and extract concepts from each paper, and discussed by myself and DM. The remaining papers were extracted by myself and checked by DM. Concepts from all included papers were then

clustered into relevant categories through constant discussion and comparison. I then went back to the primary papers, and “translated” and compared our newly developed conceptual categories across all papers to ensure that all relevant data were represented. This translation process was conducted in Microsoft Word, with workings presented in the translation table (Appendix 21).

After completing the stages above, I organised the categories by higher-level themes to generate a visual conceptual model to illustrate how the internship experience influenced medical doctors’ career intention/decisions, i.e. our “line-of-argument”. I also applied the GRADE-CERQual framework, an approach to assess how much confidence to place in findings from qualitative evidence syntheses, to define the confidence at the category level (121). The assessments were made by myself and discussed with DM.

5A.3. Results

[Search results and article overview](#)

Figure 15 summarises the results of the search process. Of 6,085 citations identified after deduplication, 26 met inclusion criteria after the full-text review. Three further studies were excluded after quality appraisal, leaving 23 studies for the synthesis.

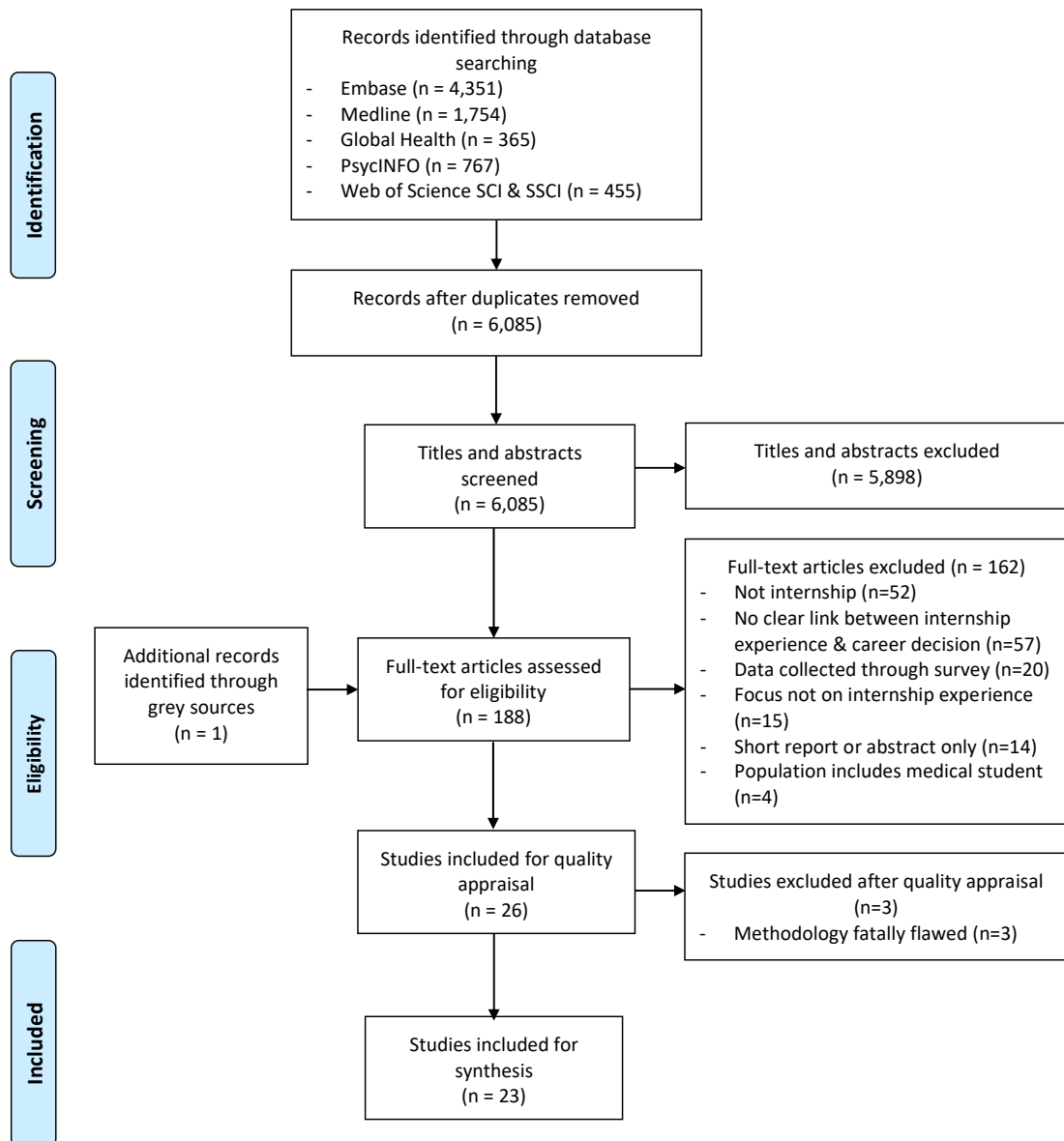


Figure 15. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart for the meta-ethnography

Table 25 provides an overview of included studies. Most studies included were from high-income countries, including 12 papers from the UK, two from Australia, and one each from New Zealand, Germany, Ireland and the Netherlands. Only three studies were conducted in LMICs; India (234), Sierra Leone (235) and South Africa (32). Fourteen papers examined career intentions (current interns considering future choices) and nine examined career decisions (doctors retrospectively reflect how they made current career

choices). In terms of the career outcome examined, 14 studies examined specialty choices (specifically six general practice, three psychiatry, one surgery and others without a specific specialty focus), three examined practice locations (including two rural practice and one migration), three investigated general career intention, two investigated why doctors are not going straight into specialty training (i.e., taking an F3 year in the UK) and one examined leaving specialty training midway (i.e., women leaving surgery training in Australia and New Zealand (236)).

Table 25. Characteristics of included studies for the meta-ethnography

Reference	Country of study	Study population	Study sample size	Study aim	Data collection methodology	Career outcome	Career intention or decision	CASP score (out of 20)	Assessment
(237)	UK	General Practice Specialty Registrars	49	Understand comments made in clinical settings to GP trainees about GP	Mixed methods - questionnaire survey, focus group discussions	Specialty choice - general practice	Decision	16	satisfactory
(238)	UK	Psychiatry trainee	21	Explore factors that influence attitudes towards mental health and a career in psychiatry	Qualitative -in-depth interviews	Specialty choice - psychiatry	Decision	20	key
(239)	UK	Foundation year 1 doctors	14	Understand lived experience of psychiatry placement and how job components influence attitudes	Qualitative - semi-structured interviews	Specialty choice - psychiatry	Intention	20	satisfactory
(240)	Australia	Junior doctors graduated between 1-6 years	41	Understand the effect of rural placements on perception on working in rural area	Qualitative - semi-structured interviews	Practice location - rural practice	Decision	18	satisfactory
(241)	Ireland	Interns	5	Understand factors influencing specialty choices of medical students	Mixed methods - questionnaire survey, focus group discussions	Speciality choice	Intention	16	satisfactory
(242)	Australia	Postgraduate year 1-5 junior doctors	21	Understand factors influencing career decision-making with respect to specialty area and rural location	Qualitative - semi-structured interviews	Practice location - rural practice	Decision	17	key
(32)	South Africa	Doctors who completed internship up to 8 months	10	Gain insight into the medical internship process in South African state training hospitals	Qualitative - semi-structured interviews	General career choice	Intention	17	key
(243)	UK	Foundation year 2 doctors	25	Understand perceptions of general practice attachment	Qualitative - semi-structured interviews and focus group discussions	Specialty choice - general practice	Intention	16	satisfactory
(244)	UK	Foundation year 2 doctors	24	Investigate what influences decision-making about general practice as possible career	Qualitative - semi-structured interviews	Specialty choice - general practice	Intention	19	key
(236)	Australia and New Zealand	Women who chose to leave	12	Understand reasons for women to leave surgical training with a feminist lens	Qualitative - interviews	Others - leaving specialty training	Decision	19	satisfactory

		surgical training							
(245)	Germany	Practice year students	19	Understand barriers of practice year students with GP tertiary electives	Qualitative - guided interviews	Specialty choice - general practice	Intention	16	satisfactory
(246)	UK	Foundation year 1 doctors	74	Understand attitude of newly qualified doctors towards GP career	Qualitative - focus group discussions	Specialty choice - general practice	Intention	16	satisfactory
(247)	Sweden	Young doctors undertaking specialty training	15	Understand the processes preceding specialty choices and the influence of perceived status and other symbolic capital on their choices	Qualitative - in depth semi-structured interviews	Speciality choice	Decision	17	key
(248)	New Zealand	Final year undergraduate medical students	11	Explore factors that influence attitudes towards general practice as a career	Qualitative - focus group discussions	Specialty choice - general practice	Intention	20	key
(249)	Netherlands	Final transition year students	24	Understand factors influencing career choices of medical students in final study year	Qualitative - in depth semi-structured interviews	General career choice	Intention	20	satisfactory
(250)	UK	Foundation year 3 doctors	14	Explore the reasons why doctors are choosing to take a year out of training and impact upon future career choices	Qualitative - in depth semi-structured interviews	Others - not go straight into specialty training	Decision	18	key
(251)	UK	Foundation year 2 doctors	21	Understand Foundation year 2 doctors' workplace support and its influence on career intentions	Qualitative - semi-structured interviews	General career choice	Intention	20	key
(35)	UK	Foundation year 1 doctors	17	Explore reasons for doctors to leave UK medicine	Qualitative - semi-structured interviews	Practice location - migration	Intention	20	key
(36)	UK	Foundation year 2 doctors	20	Understand workplaces, practices and colleagues' effect on doctors' career decision	Qualitative - narrative interviews	Speciality choice	Intention	18	key
(234)	India	Psychiatry residents	17	Explore reasons for choosing psychiatry for future specialisation	Qualitative - focus group discussions and in-depth interviews	Specialty choice - psychiatry	Decision	16	satisfactory
(252)	UK	Foundation year 2 doctors	16	Explore the reasons for foundation doctors choosing not to go straight into specialty training	Qualitative - semi-structured interviews	Others - not go straight into specialty training	Decision	20	key
(253)	UK	Pre-registration house officers	15	Explore female pre-registration house officers views of surgery as a possible career	Qualitative - in depth semi-structured interviews	Specialty choice - surgery	Intention	17	key
(235)	Sierra Leone	Junior doctors	15	Explore the career aspirations and specialist training preferences and choices	Qualitative - in-depth interviews, digital diaries	Speciality choice	Intention	14	satisfactory

Most studies were assessed as good quality against the CASP checklist (Appendix 20), however, most lacked a description of the relationship between researchers and participants (Q6). I also rated the papers based on their relevance as described by Dixon-Woods et al (254): Twelve papers were rated as key papers and 11 as satisfactory.

I identified 14 categories of how internship experience influence doctors' career intention/decision, further summarised into three high-level themes. Descriptions are provided below and in Table 26.

Theme 1: Finding which career option is “more me”

The papers suggested that interns appraise the potential personal fit between their clinical interests and lifestyle, and to find the “more me” option among different specialties, different roles and positions, and different organisations.

The importance of hand-on experiences, real-life exposure (category 1) and positive experiences (category 2)

The papers drew attention to how the experience of employment gave interns real-life exposure of what it means to be a doctor (with significantly more clinical responsibility as compared with medical students, e.g. prescribing, communicating with patients and families). This appeared to enable them to realise what “fits” with their personality (235,251), what they enjoy doing (234,235,249,253), and what is “more me” (235), which influences career decision making (32).

Importantly there were cases where interns felt poorly prepared for the tasks they encountered e.g. “not feeling confident managing very unwell people” and describing it as anxiety-inducing (36,240), or not feeling adequately prepared to enter specialty training (35). Some studies also suggested that interns realised their responsibilities were quite different from experiences as a student forcing some to reconsider their career choices (238,244).

“I hated my job [psychiatry] but I loved it as a student... I just found it really depressing as a doctor whereas as a student I found all the stories really interesting.” [GPOP18-(36)]

Positive experiences in managing patients, making decisions regarding their care, and seeing positive results helped boost interns’ confidence and sense of readiness (245,251) and inspired some to develop skills in areas they felt inadequately prepared for by medical school (238). In some cases, interns could also rebuild their previously damaged confidence with a supportive team and positive experiences (36,248), as an example of positive experience:

“It’s a decision that I don’t think I would’ve made. Actually thinking back to making that decision, knowing how confident I was that I enjoyed anaesthetics; it still felt like a big thing to click that button and apply for that job. I most definitely wouldn’t have done that if I hadn’t had that experience in anaesthetics.” [Story 2 Steven-(251)]

Considering work-life balance (category 3) and wellbeing (category 4)

Internship exposes individuals to the workloads and working hours of different rotations. The ability to control working hours was a considerable influence on their career decision. Most studies reported having a manageable work-life balance and specialties that fit with lifestyle aspirations as having considerable influence on career decisions, which also had a gender aspect to it, e.g., having children and raising a family (234,235,246,249,251,253).

Interns seeking a good work-life balance and the flexibility to pursue interests outside of work seemed to be drawn to specialties that had more regular working hours (234,239,245) and some interns stayed away from specialties they loved and had a passion for because the demands of work conflicted with their personal desire to achieve a proper work-life balance (36). Internship experience in rural areas was attractive to some interns because of the rural lifestyle, perceived lower stress and greater ability to maintain work-life balance (242). As an example for work life balance:

"I would love to do gastroenterology, but... I just know I wouldn't have a good work-life balance. Work-life balance is really important to me, I'd probably say more so than what I want to do in my career... if I'm not enjoying myself out of work, it's just not worth it for me." [GPOP10-(36)]

Linked to the working hours and work-life balance were exhausting and stressful rotations. Some were described as being a treadmill with no breaks contributing to burnout and impacting wellbeing (251). Others (e.g. general practice) were described as being lonely with no support and team spirit (246). Psychiatry was seen as emotionally draining, with some interns casting doubts on whether they saw themselves working in that field in the future (239).

"When you're with a patient and in particular a depressed patient...you feel emotionally drained at the end of it so I don't know if I could cope with doing that all day for the rest of my life." [Participant 10-(239)]

The role of self-identity (category 5)

Although only reported in a few papers, interns also reflected on whether their proposed career, as well as its status and public image, fitted with their self-identity and whether they would be considered a "proper doctor" by choosing these specialties. For instance, they were concerned about being deskilled by choosing to pursue psychiatry because of not dealing with physical health problems (238). General practice was perceived to

attract less respect and a negative public image because of lack of awareness of what GPs do (36,237). On the other hand, specialties such as surgery were considered to be of a higher status and power (247).

“I don’t care what my friends and family think, it’s the wider population. ... I had the girl doing my nails one day. She said, ‘Oh, what kind of doctor are you going to be?’ I said, ‘I’m going to be a GP’. And she said, ‘Oh, do you have to go to medical school for that?’ And I just thought, ... there’s just that a bit less respect, isn’t there, than, ‘Oh yes, I’m a brain surgeon.” [GP1P16-(36)]

Theme 2: Exploring, experiencing, and witnessing workplace and organisational norms

Through working with people including their direct supervisors/consultants, peers, senior colleagues including medical and nursing staff as well as with the local community, interns got to explore, experience, and witness workplace and organisational norms of medical facilities. This also helped them decide on which specialty, organisation and work locations are preferable.

Relationship with consultants (category 6), peers (category 7), senior colleagues and the team (category 8)

The findings demonstrated that consultants and supervisors had a considerable influence on career choice (241). Supervisors as role models moulded interns’ attitudes, making them feel valued and supported (36,251) and inspiring interns to want to be like them (237,248,249). Some consultants also lobbied interns towards their specialty (247). In contrast, bullying from supervisors or lack of role models to look up to were reported to contribute to interns shying away from or pausing a career in those specialty areas or work locations (35,236).

Building relationships with peers and other team members also played a vital role in enriching interns' experiences. Positive workplace relationships with other seniors including medical staff and nursing staff influenced career decisions, as they acted as a source of information on training and work opportunities (242). Interns also sought information from colleagues and from social events organised by specialty unions, career workshops and shadowing doctors to inform their career decision (36,234,242,247,249). In some other cases, interns witnessed their specialty registrars being "broken", or felt unwelcomed or unsupported by the team, or were blamed by seniors when things went wrong, and thus switched their career plans to a different specialty (36,251). As an example of relationship challenges with nursing staff:

"The nursing staff wouldn't listen to me. They would then go and get consultants and run everything I did past them. There are some strong characters in that department and it's well known that that is the case. I just clashed with them and I find it quite condescending and made me feel like, that you weren't a doctor, that you are more a medical student because everything you said had to be verified by a consultant." [P9-(35)]

Competition between peers put some interns off certain specialties, especially when it was felt to be unhealthy and constraining (247).

"At the surgical and orthopaedic departments where I've been, you need to be fairly assertive, even bullish, to somehow get the educational experience you need. You have to make sure you get into theatre, struggle, really, and hinder others in your way to becoming a specialist. And that was not something I had any desire to do. Being somewhere where there was a lot of competition, I wasn't interested in that. At all'. [No. 5, internal medicine, woman-(247)]

Relationship with patients and the community (category 9)

Another key category emerged on relationship with the community. Through working with patients and the community, interns were able to develop close doctor-patient

relationships and felt integrated into the community (249). These experiences made interns appreciate the psychosocial aspects of patient care (238) and gave them a sense of helping the community and changed perceptions of where they would want to work (240,245).

Characteristics and hierarchy of career options and specialties (category 10)

Often in their interaction with consultants and other senior colleagues, interns would hear them commenting on other specialties, sometimes stating that some are inferior (241,243,244,246). The interns themselves also developed attitudes towards certain specialties interacting with perception of self-identity as discussed previously. For instance, when discussing their career interests with their senior clinicians, “just a GP” or “too good for GP” were often used to create the impression that general practice was inferior, unworthy, unexciting or a reserve option (36,237). Interns seeking to specialise in psychiatry also described being stigmatised.

“There is always a stigma. In my medicine F2 post ... I had just finished psychiatry and when I said that I wanted to do psychiatry my consultant said something like ‘then there is no point bothering with you then’” (238)

Nonetheless, some interns perceived such comments as “banter”, and a natural consequence of consultants’ passion for their specialty.

“I think there are certain specialties that get made fun of. It hasn’t really had any impact on my decision making. I think probably because they get made fun of, partly, because people are jealous.” [FD24, anaesthetics-(244)]

Workplace resources, environment (category 11) and feeling valued by the organisation and healthcare system (category 12)

Interns were drawn to workplace environments with sufficient resources, that were supportive and seen to have high morale. Poor rest facilities, limited access to catering facilities and limited parking contributed to feelings of being unappreciated. This was compounded by the pressures from workloads, to cover rota gaps and from working in poorly resourced facilities (250,252). In some cases interns felt undervalued and disengaged leading to frustrations with the whole system (251). They described being viewed as “ward mules” used for “service provision” (250) or the “cheapest option” to fill rota holes and therefore felt only valued for the heavy workload they carry (252).

“...So the thought of having to do six, seven years to consultant, there’s no way. There’s literally no way I would do it. Management don’t know who I am, don’t know what I’m about. And if I raise a concern, I think they see that you’re a hassle, it’s a problem, as opposed to, you’re a valued team member that they think is worth being there. I don’t, yes, I don’t feel valued in that capacity. [Story 5 Clare- (251)]

Additionally in one study from South Africa, interns described frustrations with the public health sector, especially regarding management’s misappropriation of funds meant to provide essential resources and equipment in hospitals leading to frequent stockouts, thus “that’s why everybody is leaving” (32). This could be a specific issue for LMICs.

Theme 3: Worry about the future

Aside from personal best fit and the norms of the current workplaces, interns also considered the future implication of their possible career choices, especially whether they would get a job and whether they would advance their career from a training and professional development perspective.

Job market policies and changes (category 13)

Job market policies like wages and employment contracts, and interns' perceptions about the future job market influenced their career choices. Interns described choosing specialties strategically based on existing workforce gaps or a growing need (e.g. "more employable" (235)), or on the contrary after witnessing senior doctors encounter a lack of job opportunities and being disillusioned (241). In some contexts (e.g. UK) changes in junior doctors' contracts also made alternative specialist training unattractive compared to General Practice because the latter has a shorter training period. Changes in employment contracts for junior doctors also made interns consider migrating to work in other countries where they would strike a good work-life balance with better working conditions (35). However, the influence of job market policies and changes may be limited as they are sometimes difficult to predict (241).

Future training and professional development opportunities (category 14)

Interns described an interest to pursue specialisations where there was more 1:1 mentorship and training, as well as commitment from the seniors and the organisation towards professional development (35,251) instead of specialisations where they perform mundane administrative tasks (252). On some other occasions, interns with an interest to work in rural areas were frustrated by lack of training pathways and future development opportunities if they do not want to proceed with a GP pathway (242):

"I actually find it very disappointing after working in rural areas and wanting to go back to those areas so badly, that unless you specifically want to be that rural GP, there's firstly no pathway. And two, it's not only not encouraged, it's almost frowned upon. I find it amazing because the whole time I was in rural areas people

talk about how much they're trying to bring people rurally. When I look at it I kind of see a lot of closed doors." [I19; Male; FGY1-(242)]

Table 26. CERQual Summary of Qualitative Findings for the meta-ethnography

Categories	Studies contributing to the review findings	Overall CERQual assessment	Explanation of judgement
Theme 1: Finding which career option is “more me”			
1. The “hand-on” experience and “real life” exposure	16/23 (32,35,36,234,235,237,238,241,243–246,249–251,253)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the recruitment and analysis processes were not clearly described
2. Positive experience, confidence and readiness	9/23 (35,36,238,240,244,245,248,251,252)	Moderate confidence	Very minor methodological concerns on relationship between the researcher and participants in a few studies, moderate concerns regarding relevance as all reported from HIC and no LMIC data
3. The workload, work-life balance, lifestyle	16/23 (32,35,36,234,235,238,239,241,242,245,246,249–253)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the analysis processes were not clearly described; and minor concerns regarding coherence
4. Well-being, emotional stress and the need to step off	9/23 (32,35,238,239,244,246,250–252)	Moderate confidence	Moderate concerns on relevance as all reported from HIC, the one paper from South Africa did not explicitly relate this with career decision/intention
5. Image of professions and self-identity	7/23 (36,237–239,246,247,253)	Very low confidence	Serious concerns on adequacy as studies only offered thin or very thin data; Serious concerns on relevance as all studies reported specialty choices only, not clear if it is directly relevant to internship experience and that all studies from HIC, no LMIC data
Theme 2: Exploring, experiencing, and witnessing workplace and organisational norms			
6. Relationship with supervisors/consultants	16/23 (32,35,36,234–238,240,241,246–251)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the recruitment and analysis processes were not clearly described
7. Relationship with peers	7/23 (35,235,242,247,249,250,252)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies some other aspects were not clearly described; minor concerns regarding relevance as most but one paper are from HIC
8. Relationship with senior colleagues and the team	12/23 (35,36,234,237,241,242,244,246,248–251)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the recruitment, ethics and analysis processes were not clearly described
9. Relationship with patients and the community	6/23 (235,238,240,245,246,249)	Moderate concerns	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns on adequacy as studies offered moderately rich to very thin data; minor concerns regarding relevance as most but one paper are from HIC
10. Characteristics and hierarchy of career options and specialties	10/23 (36,235–238,241,243,244,246,253)	Moderate confidence	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns on coherence; Moderate concerns regarding relevance as all studies reported specialty choices only, not clear if this will be relevant to other career options and most reported from HIC, one LMIC data

11. Workplace location, condition, resources and environment	6/23 (32,35,234,242,250,252)	Moderate concerns	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns on adequacy as studies offered moderately rich to very thin data
12. Feeling valued by the organisation and healthcare system	6/23 (32,35,242,250–252)	High confidence	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns regarding relevance as most but one paper are from HIC
Theme 3: Worry about the future			
13. Job market polices and changes, job security: will I get a job	9/23 (35,36,235,237,241,242,246,250,252)	High confidence	Only minor methodological concerns as in another few studies the recruitment, ethics and analysis processes were not clearly described; and minor concerns on coherence
14. Future training and professional development opportunities: will I get advanced	8/23 (32,35,242,246,248,249,251,252)	High confidence	Only minor methodological concerns as in another few studies the recruitment, ethics and analysis processes were not clearly described

Confidence in findings

Details of our GRADE-CERQual assessment are provided in Table 26 and Appendix 22. The assessment of confidence applies only to the 14 categories. I rated 8 categories of high confidence and 5 moderate confidence. The “image of professions and self-identify” was rated very low confidence due to concerns about data adequacy and relevance.

5A.4. Discussion

My meta-ethnographic review summarised how experiences during internship appear to significantly influence medical doctors’ career intentions and decisions. I developed a conceptual model to illustrate the journey of career intention/decision making during this period (Figure 16). The synthesis highlights that improving internship experiences and career decision-making is a broad agenda. It spans ensuring sufficient and positive clinical exposure while maintaining work-life balance and wellbeing, improving workplace environments and culture, building a supportive relationship with consultants and other medical and nursing team members, and relieving worries about future job security and professional development following the internship period.

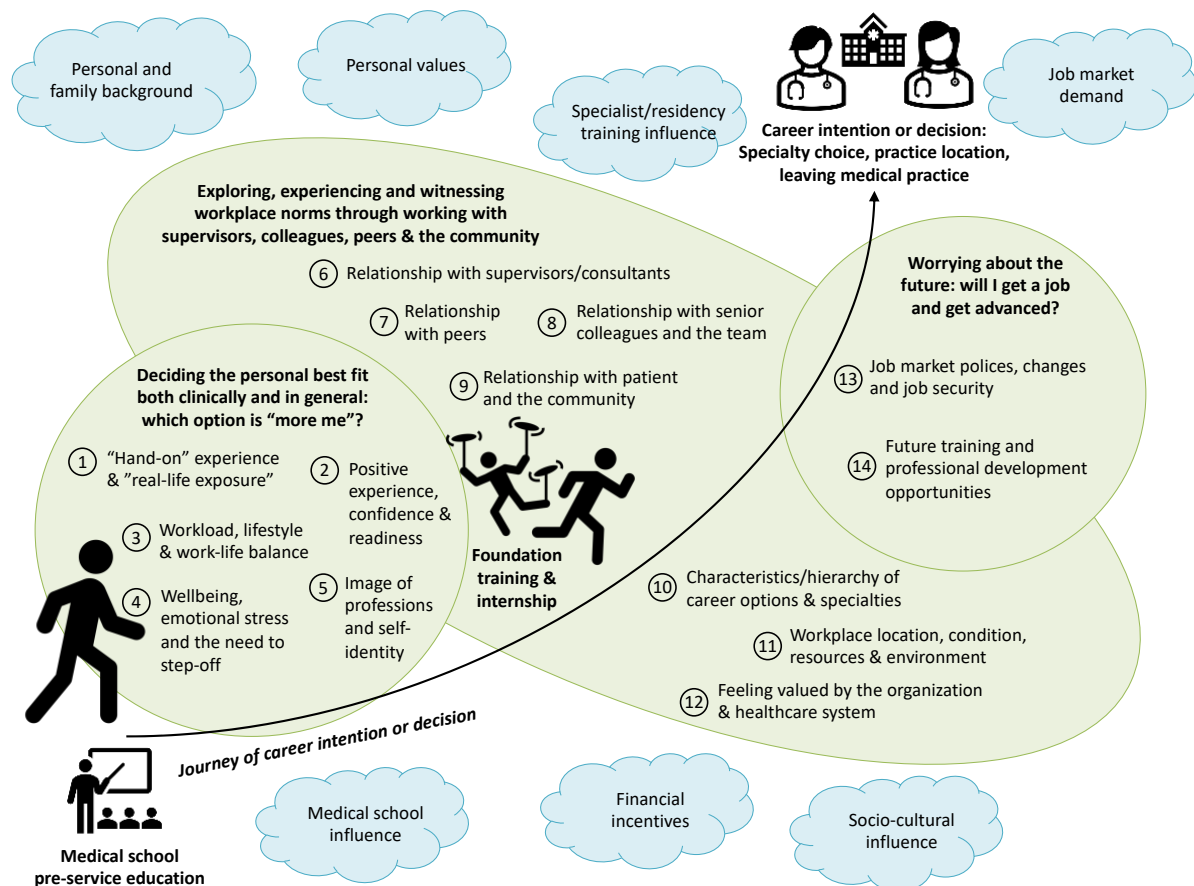


Figure 16. Line of argument for the meta-ethnography

Note: The final phase of meta-ethnographic analysis is to develop a conceptual model or line of argument that is abstracted from, but more than the sum of, the themes. This figure illustrates our conceptual model which is the journey of career intention decision-making and how foundation years and internship influence such journeys. These junior doctors' intentions may be shaped early during medical school training, this can be cemented or changed during the chaotic and stressful foundation year and internship training period, which is the focus of our synthesis. Foundation doctors and interns need to decide on the "more me" option of possible career choices (category 1-5), draw on experience in the workplace and relationships with different groups of people (category 6-12), and also think about the future implications of career options (category 13-14). These categories are intertwined and overlapping. I also acknowledged many other factors including personal and family background and personal values may play a significant role in the career-decision making, and doctors could further change their mind during specialist training; moreover, the career decision is also influenced by the job market and employment terms and conditions. These factors extracted from previous reviews are represented (in "blue clouds") outside of the main categories identified by this review, though it should be noted that this is by no means an exclusive list of factors that influence career intention or decision.

While this review focused only on qualitative studies, the impact of internship experience on career decisions is also evidenced by quantitative studies. A survey in Ireland suggested that negative experience as an intern, especially burnout and callousness, was

significantly associated with doctors' intention to leave the country permanently (37). Another study in Australia that surveyed medical, nursing, pharmacy and allied health students also confirmed that students satisfied with their rural placement (16-20 weeks for medicine and allied health students and 2-8 weeks for nursing and pharmacy) were twice as likely to consider living and working in a regional, rural or remote location following graduation, after adjusting for other demographic covariates (255).

These findings also align with the wider literature on career decisions and identity work. The social cognitive career theory by Lent et al. (109) suggests the influence of personal, environmental and learning experiences and the interaction between these as well as contexts that shaped personal agency, formulation, pursuit and attainment of career goals and also performance (109,110). Identity theories such as "possible selves" (256) and "provisional selves" (257) further illustrate how the decisions are made between different career options. Interns observe role models (consultants, or other senior colleagues) to identify potential identities. They then experiment and try on different career options throughout different rotations to inform their career intentions and who they want or fear of becoming, i.e. "possible selves" (256). The theory of "provisional selves" further describes how these possible professional identities are formed, and the process may also include self-evaluation (internal self-congruence) and perceptions of external judgment from either peers, colleagues or society (257). This is in line with our findings, especially as interns figuring out their self-identity, relationship with other colleagues and seniors as well as absorbing comments from others on the characteristics and hierarchy of career options and specialties.

These findings have important implications for policy and practice. While internship trainings are context dependent, the following practices should be considered and tested to understand their impact on career planning. Medical regulators and training institutions should ensure interns have sufficient exposure to different career options including specialty rotations and work locations to account for varied preferences. The internship environment should also be regularly monitored to ensure adequate resources are available (258). This exposure should allow interns to explore different potential career interests and whether they match their clinical and lifestyle expectations, e.g. incorporating rural clinical rotations may attract junior doctors into rural and remote area practice (226); arranging short specialty tasters or shadowing senior colleagues may interest junior doctors in specialties with recruitment difficulties (259). Changes in contractual, job market and future training policies should also be clearly communicated well in advance, by policy makers, regulators and training institutions, to clearly signal upcoming opportunities and alleviate stress about future job security.

Most studies did not report interns receiving formal advice from career advisors, but consultants and other senior colleagues seem key sources of information (35,36,234,242). Resources, guidance and training should be provided to senior healthcare professionals so they can ensure good mentoring practices, like having regular one-to-ones with trainees focusing not only on educational and academic progress but also on professional and personal growth (158,260), refraining from undermining specific specialities and incorporating this into faculty development (237,261) and learning how to best support junior doctors' career decision-making processes. Lastly, sufficient resources like rest and catering facilities and a positive and supportive working

environment should also be provided so that interns feel valued, instead of just being made to feel like “cheap labour”. This could be as simple as asking consultants and colleagues to remember the names of their trainees (251,262).

Several limitations should be considered for this review. To start with, as meta-ethnography is an interpretative approach to qualitative evidence synthesis, a different research team might provide a different interpretation of the data. In this case I re-interpreted some first-order constructs when the paper did not primarily focus on linking experience and career outcomes but where I found relevant data. While I did not contact the original teams and clarify such re-interpretations, the extraction and interpretation of concepts were led by myself and reviewed by DM, and further shared and discussed within the whole research team for validation and feedback. Second, I had a very strict definition of internship experience during the screening process and excluded papers focusing on residency unless the papers explicitly stated that the focus was on the first year of residency which is commonly referred to as internship. This resulted in not including any paper published from the US and other countries where the internship year is embedded in multi-year specialty residency programs, thus our findings might be less applicable to those settings. Third, I acknowledge that both internship and career preference are context-dependent and vary by the socio-cultural environment of the geographical locations in which they are situated and the health system structure. For example in some countries including the UK, the choice to enter the private sector is much more constrained, especially for early career doctors as post-graduate training opportunities are limited to the public sector. Also, “rural” practice in high-income countries could be quite different from many LMIC settings which may be more under-

resourced and lacking basic infrastructure (263). Additionally, much of the included literature is from a small set of countries - for example, only three of included papers are from LMICs which reflects the paucity of data from regions where the internship experience could be most stressful and from which many junior doctors choose to migrate after internship (32,42). Future work is needed to investigate internship experience and career outcomes in different settings and additional factors linking internship experience and career intention/decision. Lastly, while this study focused on a broad list of career outcomes, I did not explicitly differentiate career intentions and career outcomes. Interns could choose a different specialty than their intention due to job market demand or training availability, and such decision-making is dynamic and could change even during specialty training. The conceptual model (Figure 16) recognised such limitations and highlighted job market demand and other factors that influence career choices identified in previous systematic reviews. I recommend future studies explore whether this conceptual model is appropriate across different countries and contexts, including for different modes of internship (e.g. in the US) while extending research to other factors that might influence career outcomes such as personal values, medical school experiences and job market demands, and other career outcomes for example non-patient facing specialties, research and management.

Section 5B. Internship experience and career intention in Kenya medical interns

This section includes content from Zhao Y, Mbutia D, Ankomisyani DS, Blacklock C, Gathara D, Molyneux S, Nicodemo C, Okello TR, Rutebemberwa E, Tweheyo R, English M. *The influence of internship training experience on Kenyan and Ugandan doctors' career intentions and decisions: a qualitative study. Global Health Action. 2023 Dec 31;16(1):2272390.*

5B.1. Background

The previous Section 5A revealed a range of ways in which internship experience shapes medical doctors' career intentions/decisions, and produced a broad conceptual model of this phenomenon. The results highlighted the importance of improving the internship experience, especially focusing on ensuring sufficient, positive and inspiring clinical exposure, improving workplace environment and culture, building supportive relationships with consultants and other senior team members and refraining from undermining specific specialties. Additionally, changes in contractual, job market and training policies should be clearly communicated early to relieve doctors' worries about their future. Given the lack of empirical evidence of internship experience and career intention/decision in LMICs, I further tested out the conceptual framework developed in the Kenyan setting using qualitative interview data collected from 30 junior MOs and 10 consultants, particularly focusing on career intention.

5B.2. Methods

This study is nested in a larger piece of study aimed at understanding the internship experience of MOs where I and a Kenyan research assistant Daniel Mbuthia (DM) conducted semi-structured interviews with 30 junior MOs and 10 consultants in Kenya. Detailed information on data collection has been described in Section 2.8.

As the main objective of this section is to test out whether the conceptual model developed in Section 5A is appropriate in the Kenyan setting, I used a direct content approach to analyse the data collected (described in Section 2.8) (127). I particularly focused on internship experience and career intention. I first read through the transcripts and coded based on the 14 categories developed in the meta-ethnography deductively. Whereas new themes merged from the coding analysis that did not fit in the original model, I amended the original categories and added in new category through inductive coding and iterative discussions with DM and my supervisors. I highlighted the similarities and differences under each category between the meta-ethnography findings and the Kenyan interview results.

5B.3. Results

Interviews with MOs suggested that there are different stages where they have career intentions for post-internship work. For example, some MOs had certain specialty choices they intend to focus on which started as early as medical school, largely informed by their interactions with undergraduate lecturers and clerkship experiences. This sometimes even influenced their preferences when choosing and balloting for internship centres –

e.g. if a medical student is interested in pursuing surgery, he/she would want to intern in facilities with better surgical capacity.

MOs' intentions could be either reinforced or changed during their internship. Sometimes their allocated internship centres doesn't have their initially preferred specialties (e.g. orthopaedic, plastic surgery), or MO interns got exposed to new specialties or career options such as public health. It should also be noted that their career intentions could also be changed during their initial years working as post-internship MOs.

"I think yes, the internship experience was really had some significant impact in my professional life for instance in my case I was interested in orthopaedic at some point but now my internship centre wasn't very equipped so we weren't so much exposed to orthopaedic procedures as much during the internship so even getting that alone was very like" (Medical officer, M15 – L5 Public – Private MO)

However, MOs' career intentions didn't match their final career and employment decision as in Kenya the final employment is largely decided by job availability instead of personal preference. I will further explore this phenomenon in Chapter 6 focusing on public sector employment. In the current section, I primarily focus on MOs' career intentions and how internship experience influences their intention. Full comparison of the meta-ethnography framework and the Kenyan results is shown in Appendix 23.

Theme 1: Finding which career option is "more me"

Similar to the meta-ethnography findings, "hands-on experience" and "real-life exposure" (original category 1) were described as important as MOs' career interests could be cemented or changed during internship. Continuing medical education (CME) sessions

were also mentioned by MOs as one source of exposure that sparked MOs' interest in certain specialties.

"Positive experience, confidence and readiness" (original category 2) were also mentioned by Kenyan MOs as good experiences in certain rotations drew their interest in some specialties while bad experiences turned people off. In addition, in some cases MOs may not get enough exposure or experience in certain areas and thus wanted to fill those gaps and further strengthen their capacity in their post-internship MO jobs, which influenced their intention on where they wanted to work.

"I had wanted to major in surgery because I feel like it really not exhausted my potential during my internship at the surgery department, so I wanted to start with surgery so that I can learn as much as I can but that was not possible then."
(Medical officer, M02 – L5 Public – Public MO)

"Workload, work-life balance, lifestyle" (original category 3) and "well-being, emotional stress and the need to step off" (original category 4) were also relevant to the Kenyan MO. As interns prefer jobs with more manageable workloads based on their observation of their senior colleagues, and some specialties were also described as very stressful and "living on the edge" which turned MOs away. The difference in workload between public and private facilities was constantly mentioned by Kenyan MOs but less so in the meta-ethnography.

While "professional image and self-identify" (original category 5) are similar between the meta-ethnography review findings and the Kenyan data, what's new from interviews with Kenyan MOs is that some specialties were considered for 'other cadres' such as clinical

officers and nurses thus “not for doctors”. However, in both cases this category was the weakest and not supported by adequate data.

“Well just a general feeling, not really from my supervisors or anything. But I don’t know, guys don’t like doing anaesthesia. Yeah, they feel that there is no work for them, they only work in ICUs, you know there was a course that was introduced, it is for clinical officers. So they specialise in anaesthesia and then nursing, nurses can also do, become an anaesthesia nurses. So these days, most of the work is done by the clinicians. And for you to get employed as an anaesthesiologist it is not that easy and most of the other medical officers they say, quote and quote the feeling is the, they say lazy or something people don’t like to read.” (Medical officer, M20 – L4 Public – Mission MO)

Theme 2: Exploring, experiencing, and witnessing workplace and organisational norms

Kenyan MOs also reported that their relationship with different people at the workplace influences their career intentions. “Relationship with consultants” (original category 6) was constantly emphasised as the most important factor for many but not all MOs. Besides receiving encouragement, mentorship, career advice from their consultants and thus “wanting to be like them”, or witnessing “bad examples” such as consultants without professionalism or who are bullies and thus changing their career intentions – both showed up in the meta-ethnography findings, MOs also commented that as interns they witnessed and observed consultants that were “successful” or “struggling” which impacted their intentions; and also interns who perform well could directly secure locuming opportunities from their supervisors.

“My interaction with my consultants and my, really...it did because one, I will- First, of all, let me just say that money is normally a very powerful incentive for anything. So some of my lecturers, my undergraduate years seemed to be living very comfortable lives for example...Another example of a successful radiologist is another one who I also interacted with very closely. He was not my lecturer, but we interacted with him in the ward, extracurricular life. He is called Dr. [Name]. He’s also very, you know, financially comfortable. So that is one of the, that was

one of the, that one to be honest, also inspired a lot of interest on my side.”
(Medical officer, M11 – L4 Public – Public MO)

While the Kenya data also suggested that interns talk to peers to understand and share working experiences in different hospitals and potential job opportunities (“relationship with peers”, original category 7), I did not identify any data relating to “validation” by peers, maintaining “personal relationship” or competition with peers. As for “relationship with senior colleagues and the team” (original category 8), similar to the review findings, interns drew experience from senior colleagues who may be immediate past interns and sought job opportunities from them. MOs also mentioned nurses being inspiring for their career intention during the internship. However as opposed to the review findings, registrars were not mentioned in our data, which might be due to different training systems in Kenya as registrars tend to work in a small number of Level 5 or 6 hospitals. Findings on “relationship with the patient/community” (original category 9) were similar between the meta-ethnography and the interview data.

The Influence of “characteristics and hierarchy of career options and specialties” (original category 10) on MOs’ career intention was also indicated in the Kenyan interview data as certain career choices and specialties would be looked down upon or associated with certain characteristics. For example, working in research after internship is acceptable but all other options outside of clinical practices are not; ophthalmology is considered for women, neurosurgery and orthopaedics for men; psychiatry is looked down upon as a specialty choice. What’s new from the Kenyan setting was that this not only led to certain specialties being less appealing to MOs as career choices, but also led to MO interns

being less exposed to those specialties during their training due to consultants or internship coordinators' neglect of those rotations.

"...because we were the first lot that had the mandatory psychiatry rotation in internship, but then just from the onset, coordinator, wh's a surgeon just told us like tha's not really going to happen. "'m not going to give you time to rotate in psychiatry" ... For us we were told like w'll only do Friday psychiatry clinics, outpatient, with the family medicine consultant, and that was final, no discussion! And then w're also told that, you know, le's like forget about the community health rotation which some of us had great interest in and, you know, it was just like since the're not really entirely hands on, entirely clinical, entirely hospital based, areas of interest, then i's not important, you know, yo're supposed to be a clinician... So we actually had one of us that was really interested in psychiatry and she was really, she was really sad about it, because every time we raised the issue, you know, she was just shut down continuously every time she tried to talk about it and say, you know, some of us have an interest in psychiatry. It was sort of belittled like almost made fun of..." (Medical officer, M30 – L4 Mission – Business)

"Workplace location, condition, resources and environment" (original category 11)

emerged as an important factor in the Kenyan data. This is in line with the meta-

ethnography results where this category was more commonly mentioned in LMIC

settings. Two new findings from the Kenyan interviews with MOs and consultants were:

- (1) MOs preferred to work in the same facility after internship because of their familiarity with the facility setting which also made them more competitive when applying for jobs;
- (2) MOs would consider what the internship hospitals are good at (e.g. which specialty) and use that to cultivate their career interest.

"And so the hospital I worked at had a very good mental health department so I was also drawn to considering pursuing mental health so maybe psychiatry. Then they also were really good with research although you know with the military they do't publish any research findings because of national security, so at least it also pushed me towards the path 'm in right now." (Medical officer, M29 – L5 Military – Research)

The aspect of "feeling valued by the organisation and the healthcare system" (original category 12) was similar between the review findings and the Kenyan interview data as

MOs preferred to choose employers based on whether or not they feel supported and valued as interns.

One new category that emerged from the Kenyan data is “witnessing and filling health system gaps”. Many MOs described witnessing the systematic challenges in the public health system during their internship including challenges with the national health insurance scheme, preventable death, delayed referral, etc. thus wanting to pursue public health as a career. For another MO, he/she witnessed that the country is lacking orthopaedic surgeons thus prompting an intention to specialise in that, which allowed him/her to benefit the people and him/herself.

“Just the patients and just what they have to go through, you know, like the way Kenya is set up, before a patient shows up at like [Hospital J] they have gone through several other cadres or hospitals lower. And there are so many patients that I ended up losing or just having to, that suffered complications simply because they didn’t have ability to access good care from the forefront. And it was like almost every day for me. I remember a case of a police officer who showed up with stage four cancer, and yet he had been to facilities all through that could have caught that cancer, but it just kept being missed, and by the time he showed up, he was in stage four and he was just 35 years old. And that really bothered me because, one, he had ability to access that facility, they had the ability to access healthcare. So he accessed it, but wherever he accessed it, the facilities were not well equipped to make timely diagnosis. And there were so many of such stories in different forms. And for me I realised that yes, there are those who will play their role at this level 6 facilities, and there are those who need to play their role at the other level of healthcare cause, so for me, preventive medicine became important and crucial yeah, I think it’s just the experiences I encountered.” (Medical officer, M04 – L5 Mission – Public MO)

Theme 3: Worry about the future

Kenyan MOs also commented that they considered the future implications of their career choices on job security, training and professional development when making career decisions post-internship, such as “job market policies and changes” (original category

13) and “future training and professional development opportunities” (original category 14). MOs are concerned about decentralisation and job security based on their experiences as interns, and they would also choose places where they could get further advancement through training and working with consultants, and where they would not be “chronic” MOs that continued working in the same position for extended periods of time. As county governments are no longer sponsoring mMed training, the public sector seems less appealing as an option for MOs. Additionally, some MOs were more pragmatic and leaned towards specialties that are easier to get into based on their experiences.

“We don’t know what will happen after the three years because there are some who after the three years they will get confirmation of permanent jobs and there are those who don’t, so it depends with the county that you are in because there are some counties who convert from three year contract to PNP but basing on the fact that most of them are yet to have employees at their facility for more than three years, we do not know what will happen but it is pushing people away from doing, from been a chronic MO let me say a chronic MO.” (Medical officer, M16 – L5 Public – Public MO)

5B.4. Summary and discussion

This section analysing interview data with Kenyan MOs and consultants supported the conceptual framework developed from the meta-ethnography – which did not include any papers from Kenya. All 14 categories from the meta-ethnography review are relevant in the Kenyan setting as MOs decided on career intentions based on their internship experiences. I further extended the original conceptual framework by adding a new category (witnessing and filling the health systems gap) that emerged from the data. Therefore, this current analysis suggested that the conceptual framework on internship experience and career intentions is valid in a different setting, and I recommend future work in other countries and settings to further test out the framework and investigate potential links for extensions.

It should be emphasised that I primarily focused on internship experiences' impact on career intention in this chapter. MOs' career intentions did not necessarily match their final career and employment decision as the final employment is largely decided by job availability instead of personal preference. This will be further explored in Chapter 6 focusing on public sector employment. Also there are other factors such as personal values, financial incentives as listed in Figure 16 that influenced MOs' intentions that I did not explore in detail – for example the costs and duration of specialty training as well as demand for certain specialty could also determine MOs' future specialisation preference.

The policy and practice implications listed in Section 5A.4 are all relevant to the Kenyan setting. More specifically, KMPDC and internship training centres should consider different ways to provide exposures in different specialties, especially psychiatry and community health, which according to our interviews were often overlooked or even denigrated by consultants and internship coordinators. This will be further discussed in Section 7.2. Short training or rotations in public health and management could be considered as a new addition to MOs' undergraduate curriculum or internship to allow them a deeper understanding of the health system set up in the country and attract interns into relevant fields. Job insecurity and lack of further training opportunities as a result of decentralisation changes were also mentioned by Kenyan MOs as factors influencing their career intention. Relevant job and training policies and opportunities should be clearly communicated to MO interns during their training to reduce MO interns' worry and better support them in making career decisions.

Aside from the limitations on data collection described in Section 4B.4, this current analysis has two major limitations. First, for MOs I was only able to include three participants that did not work as a MO at the time of the interview but instead worked as researchers or in business. More interviews with participants not working clinically might lead to additional categories or findings. Second, as mentioned in the meta-ethnography, both internship and career choices are context-specific, and I am only able to test out the conceptual framework in the Kenyan setting. All the findings should be interpreted against the broad context of Kenya's decentralisation, expanding numbers of medical school and medical student intakes and poor job availability, which will be explored in Chapter 6 and triangulated in Chapter 7.

Section 5C. Chapter summary

In summary, I highlighted that improving internship experiences is not only important for ensuring doctors' health and wellbeing, but also key for informing newly qualified doctors' opinions about how they want to continue their career. Clinical exposure during internship, work-life balance, workplace culture such as relationships with consultants and other team members, and concerns over future job security and professional development are all factors that influence doctors' career preferences. Additionally, for LMICs, intern doctors might want to fill in health system gaps as they choose their future careers based on what they witnessed as interns. For countries with specific HRH challenges such as imbalance between specialties or distribution challenges, internship policies could influence this in the long run.

Nonetheless as mentioned above, both internship and career choices are context-specific. In Section 5B I only focused on career intention, which is different from career decisions. When there is a mismatch between labour market supply and demand, MOs do not always get to work where they intend to. The following Chapter 6 further explores this phenomenon focusing on public sector intention and employment.

Chapter 6. Understanding absorption of medical officers into the public sector at Kenya's county-level

This section includes content from Zhao Y, Mbutia D, Munywoki J, Gathara D, Nicodemo C, Nzinga J, English M. *Examining the absorption of post-internship medical officers into the public sector at county-level in devolved Kenya: a qualitative case study. BMC Health Services Research. 2023 Aug 19;23(1):875.*

As indicated in Chapter 5, MOs' career intentions didn't usually match their final career and employment decision, as the latter is largely decided by job availability instead of personal preference. I further explored this phenomenon focusing on MOs' labour market entry and more specifically their absorption into the public sector in this Chapter.

6.1. Background

Kenya had a severe shortage of MOs, with an estimated density of 0.23 per 1000 population in 2020, significantly lower than average for LMICs (1.4 per 1000 in 2017) (264), and there is disparity between counties in Kenya as well (75). In public sector facilities, the staffing norms and standards guideline published by the national MOH recommends 2 MOs in each Level 3 (health centre), 16 in a Level 4 (primary hospital) and 50 in a Level 5 (secondary hospital) facility (76). Salary costs for MOs during their internship year is covered by the national government, whereas post-internship MO salaries are paid by county governments in a public sector facility, with a monthly salary

nearly two to three times the cost of a registered clinical officer (a cadre of non-physician clinician) and enrolled/registered nurse, as presented in Table 4 under Chapter 1 (78,79).

The expansion of medical training in Kenya, with public universities doubling or even tripling their intakes and some government-sponsored students in private universities, was aimed at helping the country achieve high quality UHC (Table 27). In the period between 2005 and 2009 ninety-five percent (1678/1772) of graduating medical doctors were recruited to deliver health care services in the public sector (90,265). Data for the period 2015 to 2018, after individual county governments became responsible for health care delivery including local health workforce planning and recruitment, suggest only 45% (825/1,800) newly qualified and registered MOs were employed in the public sector (39). These data suggest low absorption of MOs is now a major contributor to shortages in the qualified medical workforce rather than production challenges.

Table 27. Major events related to MO training, recruitment and management

Year	Events and implications
2010-2018	Expansion of medical schools as only 2 medical school before 2010 and an increase to 11 in 2018, meanwhile number of annual outputs increased from 287 in 2006 to 628 in 2019
2010-2013	New constitution in 2010, new government formed after general election in 2013 and devolution of the healthcare system, leading to the national government became responsible for planning and regulation for health and medical education and establishing norms and standards, while 47 devolved county governments are responsible for workforce planning and recruitment
2013	Collective bargaining agreement (CBA) drafted by the doctors' union and the Ministry of Health on 300% pay-rise for doctors, review of job groups, recruitment, deployment and promotions of doctors; though county governments were not signatories to the agreement
2014	Ministry of Health published Human Resources for Health Norms and Standards Guidelines for the Health Sector , which required each Level 3 health centre to have at least two MOs and each Level 4 primary hospital to have 17

Source: (39,70,75,76,89,90,266)

In this study, I aimed to examine how post-internship MOs are recruited to the public sector at the county-level in Kenya. I drew on interview data with different stakeholders to understand the recruitment processes as well as perceived demand and supply for MOs. This study is embedded in a broader project focusing on HRH management and interventions in Kenya aiming to provide better evidence for policymakers and inform thinking on the health workforce labour market in Kenya.

6.2. Methods

Study design and framework

I employed a qualitative case study design as this allows for in-depth exploration of the complex processes of county-level health workforce planning. I defined “the absorption of post-internship medical officers into the public sector” as our phenomena and a generic Kenya “county-level” as our unit of analysis. I drew upon three sources of qualitative data: interviews with junior MOs who recently finished their internship, consultants who have supervised MOs, and county and sub-county-level managers who are involved in the planning and recruitment of MOs (Table 28).

As I sought to understand how and why (not) post-internship MOs are recruited into the public sector, my study was informed by a simplified version of the health labour market framework, which primarily focuses on the supply and demand for workforce (101,102). Workforce supply is often driven by both the labour and education sector, and it includes the number and availability of trained workers and also the workers’ willingness to accept

pay and conditions for certain jobs (101). The demand for workforce is largely determined by what the government (and other sectors) are willing to pay to hire healthcare workers, while this is usually associated with need which is derived from population and disease burden, demand and need are two different concepts (101,105).

Data collection

The data presented in this paper were collected from two sources presented in Section 2.8 (interviews with MOs and consultants) and Section 2.9 (county fieldwork). Table 28 further summarises respondent sampling, characteristics and data collection approaches.

Table 28. Data sources and collection for county-level absorption

Respondents	Sampling	Respondent characteristics	Data collection approach	Interview focus
30 junior medical officers who finished internship within 3 years (see Section 2.8)	Snowballing approach through facilitated introductions or referral by an interviewee; individuals were selected also considering different internship hospitals and current occupation	- Undergraduate training: 29 respondents trained in public universities, 1 trained in private universities - Internship hospital type: 25 interned in public hospitals, 3 in mission hospitals, 1 in private hospital, and 1 in military hospital - Internship hospital level: 14 interned in level 5 hospitals and 16 in level 4 hospitals - Current occupation: 26 currently work as medical officers, 2 work as researchers, 1 work as resident, and 1 work in business	- Semi-structured interviews - In-person or online in English between June and Sept 2021	- Wellbeing, educational and work environment during the internship, - Experiences of applying and securing post-internship jobs
10 consultants with experience supervising interns (see Section 2.8)	Snowballing approach through facilitated introductions or referral by an interviewee; individuals were selected considering different specialty	- Internship hospital type: 8 respondents work in public hospitals, 1 work in mission hospital, 1 work in private hospital - Internship hospital level: 3 work in level 6 hospitals, 4 work in level 5 hospitals, 3 in level 4 hospitals - Specialty: 2 work in surgery, 2 work in internal medicine, 5 work in paediatric, 1 work in obstetrics and gynaecology	- Semi-structured interviews - In-person or online in English between June and Sept 2021	Observations of interns' experiences during internship and employment
51 county-level and subcounty-level managers (see Section 2.9)	Two counties were purposively selected based on their HRH density and geographic locations; individuals were selected purposefully covering different departments and affiliations	- County: 14 respondents come from county A, 37 from county B - Affiliation: 11 respondents work as county health department officials, 2 work as county public service board officials, 2 work as county other department officials, 17 work as subcounty health department officials, 19 work as public facility managers	- Semi-structured individual or group interviews (22 individual interviews, 8 group interviews involving 29 participants) - In-person in English between Sept 2021 and March 2022	- Respondents' role as HRH managers - Counties' HRH interventions - How medical officers, clinical officers and nurses are recruited and deployed in counties

Data analysis

While data collection was conducted sequentially, at the data analysis phase I combined all interview data together, trying to examine and contrast different stakeholders' perspectives on the recruitment processes as well as perceived demand and supply for MOs. I used a thematic analysis approach to code all data. While there are different versions of the labour market framework with varied level of details, our analysis was guided by a simplified framework which focuses on the demand vs. supply model (101,102). I read through all transcripts, carried out some initial deductive and inductive coding according to the elements of the original framework, and core thematic areas and sub-themes were further refined and summarised as we familiarised ourselves with the data. For example, recruitment process was added as a theme despite originally not an element of the labour market framework. Preliminary findings were presented to the other two data collectors (DM and JM) as well as all other authors who were not directly involved in coding to triangulate and increase the trustworthiness of the findings.

6.3. Results

In this section, I summarise the major themes and subthemes emerging from the analysis. Figure 17 presents these themes and subthemes which are identified and guided by the simplified labour market framework. Besides issues related to supply and demand, I also summarise how the recruitment is actually done (process and stakeholders) and the impact on the labour market (outcome).

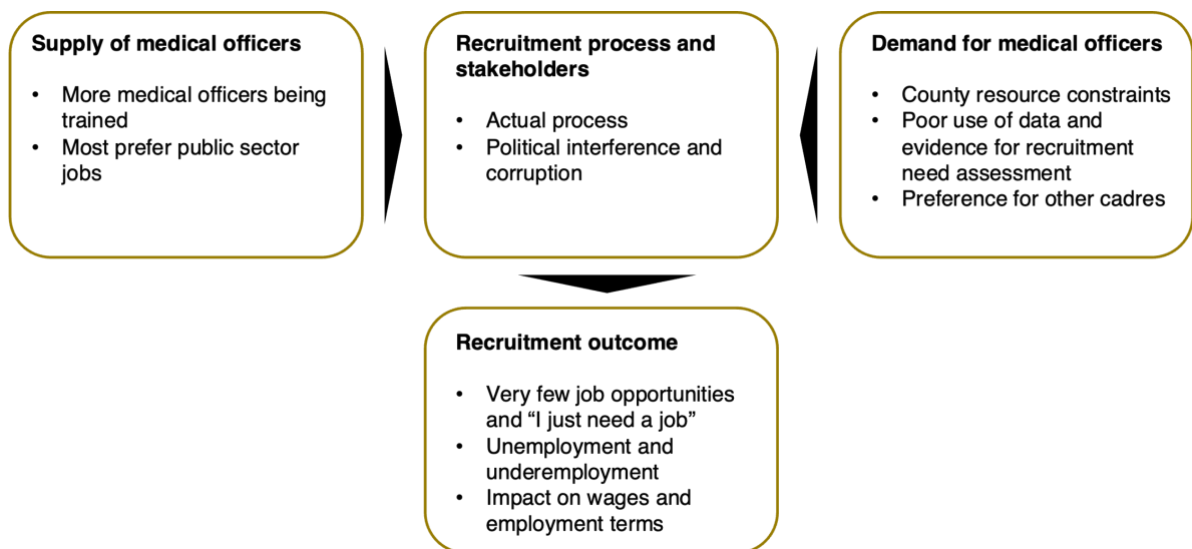


Figure 17. Summary of identified themes and subthemes for county-level absorption

Recruitment process and stakeholders

Recruitment for MOs and other healthcare professionals starts with the county Department of Health identifying gaps and sending in requests to the county secretary and the human resources committee, which will review budgets and approve/reject such requests. The recruitment process is carried out by the county Public Service Board, and their duties include advertisement, conducting interviews alongside technical experts from the Department of Health, and recruitment. Prior to devolution, recruitment was done by the national government with direct posting of MOs to health facilities. According to our respondents, health facility managers are now not directly involved in the MO recruitment process at the county-level, therefore are rarely able to retain interns except for a few locum positions if the hospitals themselves are able to pay for these positions.

“It's a bit complex, because we really do not know what happens, sometimes you just bump into an advert in the media and then after that you will find new people being posted to the hospital. You will not know when the interviews were conducted, who conducted interviews and under what terms these people have

come, you don't know, you'll just be told these people have come to work here.”
(Consultant, C10 – L4 Public – Internal medicine)

Political interference and corruption affect the recruitment process for cadres including MOs, according to our respondents including MOs and some managers from sub-counties. For instance, MOs would be employed despite not attending interviews while some are asked for a bribe to get jobs. Some MOs mentioned that only people from the local county and community are likely to be hired. However, county government managers suggested that local people are more likely to be retained in the long-term, which is a consideration during recruitment.

“I'm sorry to say this. You find that, you know, employment is a political tool. If, if today I am the governor, I want to reward my, my people. Most likely you, you reward them through, through employment.” (County B, B20)

“Another thing is that they employ based from tribe. If, like somebody like me coming from Western Kenya and I wanted to be employed around this area [County B] or something is very difficult.” (Medical officer, M10 – L5 Public – Private MO)

Supply of medical officers

Both MO respondents and county-level managers commented that there are many more MOs being trained in Kenya currently, as there are an increasing number of medical universities including several private universities now providing MBChB training, and several public universities increased their annual intakes. Additionally, people are also seeking medical training abroad in neighbouring countries including Uganda and Tanzania as well as Russia.

“Medical officers are finding it harder because first of all almost every other university is offering medicine nowadays. So the number of medical officers out here is quite high. So if the supply is high, and the demand is constant, the demand by the medical facilities is constant, then that means that means that the people

will not be employed as much as they used to be previously.” (Medical officer, M23 – L4 Public – Public MO)

Out of these graduates, the supply for public sector, i.e. post-internship MOs that are willing to accept pay and conditions for public sector jobs is high. While MOs have different preferences for their future practice locations due to the attributes of different sectors, according to our respondents the majority prefer public sector jobs due to better job security and remuneration, “lower workloads” and better supervision. Thus, the public sector is felt to be “easier to work in” while being more respected and improving the possibility of being sponsored for graduate studies. In comparison, a few MOs prefer private sector jobs, especially in a few prestigious private facilities because of better infrastructure and particular specialties, however the job security, working hours and remuneration are worse in most private facilities when compared with the public sector. Some other MOs also prefer faith-based facilities due to some particular specialty or their personal value.

“We all wish as doctors, especially myself, to work where my job security is good. Working with a private facility in Kenya as a doctor, your job security is not guaranteed. You can wake up in the morning you go, you find- they fire employees. So it’s not a place that I wish to be.” (Medical officer, M10 – L5 Public – Private MO)

[Demand for medical officers in the public sector](#)

Managers suggested that there is severe fiscal resource constraint in county governments to finance health workforce recruitment. MOs commented that health is not considered a priority by the county governments, which don’t want to further increase their salary expenditure. One county manager explained that the salaries of doctors and nurses are a bit high, and as salaries are included in recurrent expenditure that county governments

are legally required to limit, it's very challenging to further increase the budget for the workforce.

"I think overriding reason is finances. We keep on hearing from our county and other county governments about the wage bill, wage bill...the main reason for not employing is not that they're not there, they are there, they're qualified they're jobless, but there isn't enough money to employ to employ all, adequate numbers. That is the main reason." (County B, B34)

"The issue of counties is finances that is one because unless they are given, what they received is a package, yeah. And unless the salaries are factored in for those doctors from the national government, the county cannot absorb. They will always squeeze if they can, maybe one has retired or one has left the service, that's when they can absorb at least one or two. The vacancies are there, it's not that they are not there. They are there. But that package does not allow additional employment." (County A, A05-08)

Interestingly, interviewees from the two counties commented that recruitment for all cadres in the public sector including MOs is based on need, with gap analyses conducted by the relevant department and then forwarded to the county Public Service Board for consideration of recruitment. However, some sub-county respondents also commented that they think recruitment was not based on data or evidence, and that the county government, especially the Public Service Board, has poor understanding, planning, and budgeting capacity for the health workforce, with poor use of data and evidence for forecasting and recruitment.

"When you want to employ a new medical officer, we first do a needs assessment for our county, whether we require just a plain medical officer or specialised medical officers. and then from there we give our views that we require, this is the number we require whether it is medical officers, specialised officers. And then I think the rest, when we give our review as a committee, now the rest is from there up to the County Public Service Board" (County B, B01-05)

"I agree with you but what I am feeling is that the Public Service Board should actually be capacity built to understand what is Human Resources in Health and who is supposed to be employed? ...if we are crying that we have a shortage and the Public Service Board does not understand what we need then they need to be upgraded and understand what is happening." (County B, B13-17)

Across the health system, despite staffing norms and guidelines requiring two MOs to be stationed at each Level 3 health centre, most of these facilities have never had an MO and are not considered suitable for such cadres because they lack the infrastructure and equipment that would warrant deploying better qualified staff. For example, these facilities do not have operating theatre and many commented that MOs is not largely needed when there is only outpatient services, which could be and already being done by clinical officers.

Difference in salary costs were also an important issue for county governments when considering demand for new MOs. According to our interviewees, county governments prefer recruiting other cheaper cadres including nurses, clinical officers and even social workers instead of MOs. Instead of recruiting MOs, county governments also benefit from the annual posting of MO interns paid by the national government to their major county hospitals that are internship training centres, these interns are treated as “free labour” - even though they are not fully registered to practice, and this can discourage counties to further recruitment MOs. County government respondents also commented that they prefer recruiting nurses and clinical officers as they can work in both higher-level hospitals and lower-level health centres and dispensaries. From our county and subcounty managers perspective, the recommended staffing norms are not always useful for actual employment planning.

“I think it's cheaper to have clinical officers, let me start there. And they usually look for medical officers where, in the facilities where there are actual operating theatres because of C sections and all those procedures they think medical officers should do, and consultants. So if you have like or very large county without

facilities that have an operating theater, they will tend to take on to clinical officers and nurses.” (Medical officer, M12 – L4 Public – Private MO)

Recruitment outcomes: employment, terms and wages

Some MO respondents commented that decentralisation, the collective bargaining agreement together with health worker strikes led to way fewer job opportunities for MOs becoming available both in the public sector and private/mission sectors. They contrasted this with the increasing outputs from training schools and most MOs reported that they “just wanted a job anywhere (they) could find”. While some county-level respondents commented that the county has employed more staff overall since devolution, many MOs remain jobless and unemployed in Kenya. MOs commented that a several months’ gap between graduation and starting their first job has become the norm. According to our respondents, many MOs are now employed on very short-term contracts instead of in permanent and pensionable positions by the county government. In these short-term positions they are underemployed e.g. working very few hours, and forced to locum and engage in dual-practice. This led to MOs being demotivated, and some respondents have considered exiting the clinical workforce or migrating to other countries.

“But many people in fact, I have very many colleagues right now who are at home without work...So you find someone having, in fact, most of the interns, post internship, many people have like one year to two years job gaps, you can imagine, they have never taken back to hospital, not because they don't want, there are no opportunities.” (Medical officer, M01 – L5 Public - Research)

“And again you see when you employee somebody on contract then the next time you are not renewing the contract, how do you want to manage that person? Even you personally, how do you arrange your life? You are on contract, you are earning today, then tomorrow you are not earning, you are looking for a job elsewhere.” (County B, B01-05)

The imbalance in supply and demand also had an impact on wages and employment terms, especially in the private sector. While the private sector provides some employment opportunities, participants highlighted issues around underpayment, recruiting being done on a short-term or locum basis and the expectation of longer working hours compared to the public sector. For many MOs, the private sector was less attractive and only seen as a “stepping stone” to better employment opportunities.

“And if you apply for a job somewhere. You find these private facilities that will offer you say half of what you are getting [during] your internship, and they are already qualified doctors with a registration number...” (Medical officer, M03 – L4 Mission – Public MO)

“Most of the private hospitals are giving doctors, you just work per working hours and it's not guaranteed. This is depending on the patient flow. So you find this month you might be called for locum, then suddenly next month you're being told, 'okay, it's Covid. There are very few patients, so you're going to be on a pay cut'.” (Medical officer, M01 – L5 Public - Research)

6.4. Summary and discussion

In summary, I found that Kenya has a large and probably growing mismatch between supply and demand for MOs. There are an increasing number of medical schools producing higher numbers of MO graduates, these doubled from 287 in 2006 to 628 in 2019 (39,75,90). In comparison, despite an increase in positions in the public sector with more MOs being employed (from 1715 in 2008 to 3712 in 2018 (39,267)), the demand for MOs in the public sector has not been keeping same pace with the supply due to financial constraints and preference for other (cheaper) cadres according to our interviewee. As supply of MOs is largely driven by the education sector which is separate from the health sector, if medical education is not well-regulated this could compromise training quality as seen in other countries (268) but also could neglect the market need and demand with a drift to universities operating on a “training for profit” basis. The imbalance between

supply and demand would therefore lead to resource waste considering that medical education is also subsidised by government. As for recruitment process, where MO recruitment occurs, the process is led by the county Public Service Board and may be subject to political interference and corruption (64). The resulting surplus of MOs has led to unemployment, underemployment and migration of post-internship MOs, all this seems to be impacting MOs' wages, reducing these in private sector.

Macroeconomically restrictions on public sector wage bills limit the counties' ability to further absorb MOs into the public sector (269,270). While the Public Finance Management Act (2012) and subsequent 2015 supplement governing county budgets did not state the ceiling for HRH costs directly, they did require county governments to spend less than 70% of their total budget on recurrent costs, and personnel emoluments should not exceed 35% of county revenue (271), however this is often violated in practice (272). Specifically for the health sector which takes up roughly one third of a county's total budget, personnel costs contributed to around 60% of a county's health budget in 2020 and in some counties as high as 78% (97), especially those who inherited the provincial hospitals with a larger staff establishment. Correspondingly, Kenya has had several rounds of public sector hiring freezes, therefore it would be challenging for counties themselves to further increase their human resources number and raise expenditure for staffing.

Counties have used different mechanisms to avoid these costs such as opting for contract-based staff instead of permanent and pensionable terms (270) and used project-based hiring such as the Universal Health Coverage programme and Covid-19 emergency

responses to employ additional short-term staff (273), similar to many other countries (274). With the expansion of medical schools and more MO interns, counties also rely on these interns who are posted annually and paid by the national government and consider them as “substitutes” for MOs despite that they are not legally fully qualified. Similarly, in some counties specialist resident trainees fill the gap in providing service delivery, which both threaten quality of service delivery but also discourage potential demand for MO recruitment. As a result, despite the number of MOs and specialists in the public sector increasing from 1715 in 2008 to 3712 in 2018, jobs have not been increasing at the same rate as the supply which itself is still not adequate when compared with the national HRH norms and standards. Consequently, recently less than half of the recent MO graduates have been absorbed (39,267).

Despite recruitment being said to be preceded by a needs assessment, respondents commented that the national guideline for staffing norms and standards is not helpful as the target is high, unrealistic and hard to implement. While the national staffing norms and standards require each Level 3 health centre to have at least two MOs and each Level 4 primary hospital to have 17, currently there are on average 0.23 MOs and 5.95 MOs available nationwide at those levels suggesting an enormous gap (113). The lack of basic infrastructure and equipment such as theatres in those facilities made county managers believe that they do not need MOs but prefer to recruit other cadres to staff these facilities. More practical staffing norms and planning tools would be needed to assist county governments in projecting their workforce number and skill-mix required. Additionally better enforcement of these guidelines potentially linking with financial measures could help compliance in counties.

While the public sector is not able to fully absorb post-internship MOs, the private sector has also not taken up those available and even started to exploit MOs given the excess supply of labour. Salaries and remunerations in the private sector are not well-regulated and worse than in the public sector and employment terms are shorter contracts with poor job security. Such exploitation is also seen in other settings of decentralisation and privatisation as national civil services protections no longer apply and health workers are more exposed to unfair hiring, disciplinary and work practices (275). The faith-based sector, despite making important contributions to the health system in Kenya, only contributes to 11% of all facilities (276) and is unlikely to absorb large numbers of qualified MOs. Nonetheless we have not specifically explored recruitment processes for these sectors in this work.

The interviews with MOs and subcounty managers also suggested that they considered decentralisation led to political interference and corruption during the recruitment process, not only for MOs but for all cadres. As powers have been decentralised to the local government and not necessarily the local health departments, local elites could use recruitment as a tool to consolidate political support, enlarge voter base (266,277) and reinforce tribalism and clientelism as seen in other countries (278). Health facilities currently have very limited participation in recruitment and deployment other than a few that could afford locum positions, and facility-in-charges voiced concerns over workforce coordination as they are not involved in recruitment processes. This is in line with previous findings that show county hospitals now lack autonomy and control over human resources management which negatively impacts service delivery (279). The recruitment

process needs to be further optimised to minimise political interference, corruption and also ensure all relevant stakeholders are included in the process.

These findings have clear policy implications for Kenyan policy makers. There needs to be constructive policy dialogue between different stakeholders in different sectors to improve workforce planning, recruitment and management. Special attention is needed to match the quantity of medical school intake and MO production with the health needs and economic capacity so as to maintain a market equilibrium, alongside broader workforce planning for specialists, nurses, clinical officers and other cadres (75). Such multi-ministerial and stakeholder discussions should include stakeholders from the supply side with Ministry of Education and all medical schools to reconsider medical students' intake, and the demand side with MOH, county health departments, Kenya Health Professions Oversight Authority together with the broader national and county governments including Ministry of Finance and public service boards. There is a need to expand fiscal space for more health workforce expenditures and prepare achievable and routine workforce and costing plans. Facilities and labour unions should also be included in those dialogues to discuss options with employment terms and arrangements, and regulatory councils should also be involved to monitor and enforce county governments to employ more MOs if county hospitals are to train and receive MO interns and resident trainees.

Other options such as further recentralising HRH management functions to the national level could potentially address some challenges with poor planning and management capacity, nepotism and corruption with recruitment processes and maldistribution of the

workforce between counties. Countries like Tanzania partially re-centralised their recruitment systems for health workers, teachers and accountants in 2006, 24 years after decentralisation, to better coordinate planning, training and recruitment of the workforce (280). Similar structures for centralised management also exist in Uganda's "Health Service Commission" and Kenya's "Judicial Service Commission" and "Teachers Service Commission", and currently the discussion of a potential "Kenya National Health Service Commission" is ongoing with the proposed function of training, recruiting, deploying, transferring and disciplining the health workforce (281). However, it should be also acknowledged that re-centralisation of HRH management is not without challenges, there could be maldistribution and absenteeism in rural areas, as seen pre-devolution in Kenya (99,282).

Several limitations should be considered when interpreting our findings. To start with, we were only able to interview managers from two counties and respective sub-counties, due to fieldwork arrangements. While the counties were selected based on workforce density and geographic locations, I acknowledge that there could be variations in recruitment practices in each county, and my findings might not be generalisable to all counties e.g. Nairobi City County. Second, we used a mix of convenience, purposeful and snowball sampling approaches to include respondents from different sectors and roles, however we have a rather limited number of respondents from the county public service board and no respondent from county finance departments. Further investigation with these organisations and others such as the county secretary could help me better understand how to expand counties' fiscal space for the health workforce. Third, I specifically focused on the public sector as the majority of hospital services are still

provided through this sector, especially to the poor and those in rural areas. We were unable to interview stakeholders relevant to private and faith-based sectors recruitment even though we acknowledge their role in service delivery and as important employers for MOs. Last, while we did not focus on Covid-19, it should be noted that this study was conducted during the pandemic where they would have had a higher workforce demand, though it is also likely the pandemic and lockdown might have led to financial constraints of the governments.

In summary, I examined how post-internship MOs are absorbed into the public sector at the county-level in Kenya by understanding MOs' supply, demand, recruitment processes and decision-making, and outcomes. These findings highlight the imbalance between MO supply due to significantly increasing medical student training and only a slowly increasing demand for MO in the public sector due to resource constraints and preference for other healthcare cadres. The mismatched supply and demand leads to substantial MO unemployment and underemployment in the public sector risking their exploitation by the private sector. While ambitious health workforce norms indicate major deficits in the medical workforce, fiscal constraints threaten the ability to close these gaps.

Chapter 7. Discussion and Conclusion

In this chapter, I summarise and bring together key findings from the previous chapters which each focused on a component of the conceptual framework. I broadly summarise key challenges and opportunities within the supply and demand side of the labour market for medical officers (Figure 18) and provide policy recommendations to improve internship training in the Kenyan setting. Additionally, I summarise the tools and frameworks that are relevant to other LMICs when examining internship experiences and career transition. I finish the chapter with a discussion on additional study limitations and future research.

7.1. Summary of key findings and triangulation

Figure 18 summarises key findings based on the conceptual framework, and here I briefly summarise and triangulate these findings.

Supply of medical officers

Kenya now has an increasing number of medical schools producing a much larger supply of medical officers, the number of MO graduates doubled from 287 in 2006 to 628 in 2019 (39,75,90). While the expansion of medical training was aimed at helping the country achieve high quality university health coverage, training institutions also have the incentive to “train for profit” considering that many students now are self-sponsored and that government also provides subsidies to training institutions. For example, nearly 50% of medical students graduating from the University of Nairobi in 2013 are self-sponsored (283) and similarly 49% of our survey respondents recruited through a mix of

convenience and snowball sampling are self-sponsored (Table 14 on page 127). Additionally, the rapid expansion could have unintended consequences such as negatively impacting training quality and disturbing market equilibrium if not well-planned and coordinated. For example, the rapid expansion of medical education requires more internship hospitals and in Kenya many county hospitals became recognised as internship centres without adequate resources and capacity. As described in Chapter 3, less than half of the internship hospitals had at least five required medical specialists in key disciplines assigned, employed, seconded or part-time, as required by the national guideline (87) and the quality and safety score was low across all hospitals. Similar challenges could also occur in undergraduate hospital-based clerkship for those newer medical schools, despite this is not explored in this thesis.

Working in these poorly resourced hospitals is challenging for interns. Section 4B showed that over half of the junior MOs surveyed experienced wellbeing problems including signs of stress, anxiety and burnout, and there wasn't any formal support or counselling mechanism for them. Interns also reported working unreasonable hours due to staff shortages and poor working conditions characterised, especially by the lack of adequate resources such as medication, diagnostics and equipment as well as poor accommodation and catering services. These challenges with educational and work environments were more prevalent in smaller Level 4 internship training centres and negatively impact interns' wellbeing and ability to consolidate knowledge and skills in major specialties, consequently consultants voiced their concern regarding interns' competence post-internship.

Moreover, junior doctors' internship experiences also influenced their future career preferences to some extent, as shown in Section 5B. Throughout the internship training, interns interacted with different supervisors, healthcare teams and patients. Their relationships with consultants greatly shaped their future career intention as interns received encouragement, mentorship, and career advice from some consultants and expressed "wanting to be like them", or witnessed "bad examples" such as consultants without professionalism or who are bullies that changed their career intentions. Many MOs also mentioned the much higher workload in public hospitals as interns, systematic challenges within the public health system including challenges with the national health insurance scheme, preventable death, and delayed referral that undermine quality of care. Thus some of the interns decide to leave the profession or the public sector which is often the most resource constrained as soon as they are licensed/registered.

Nonetheless, our quantitative data (supplementary data from the questionnaire survey, not presented in the previous chapters) suggested that the majority of physicians still prefer to work in public sector hospitals (48%), or continue with specialist training (16%) immediately after internship commonly in public sector institutions, with only 6% having a preference for the mission sector and 13% the private sector. Additionally, 6% prefer roles in national or county government or parastatal organisations, 3% in non-governmental organisations, 7% in research organisations and 1% chose others.

According to qualitative interviews with MOs, the high proportion of public sector preference at labour market entry could be due to various reasons, especially better pay and job security, better supervision and feeling respected. Interestingly, despite MOs describing their internship experiences as stressful with a huge workload, some mentioned that working in the public sector as a MO has "lower workload" and is "easier

to work in” than the private sector. According to anecdotal evidence, this could be because MOs have less accountability to work full-time in the public sector once qualified, i.e. they can “cheat the system” to reduce work hours and engage in dual practice (270,284,285). Nonetheless, this high preference for the public sector results in a supply of MOs entering the job market each year hoping to work in the public sector which is much higher than its absorptive capacity.

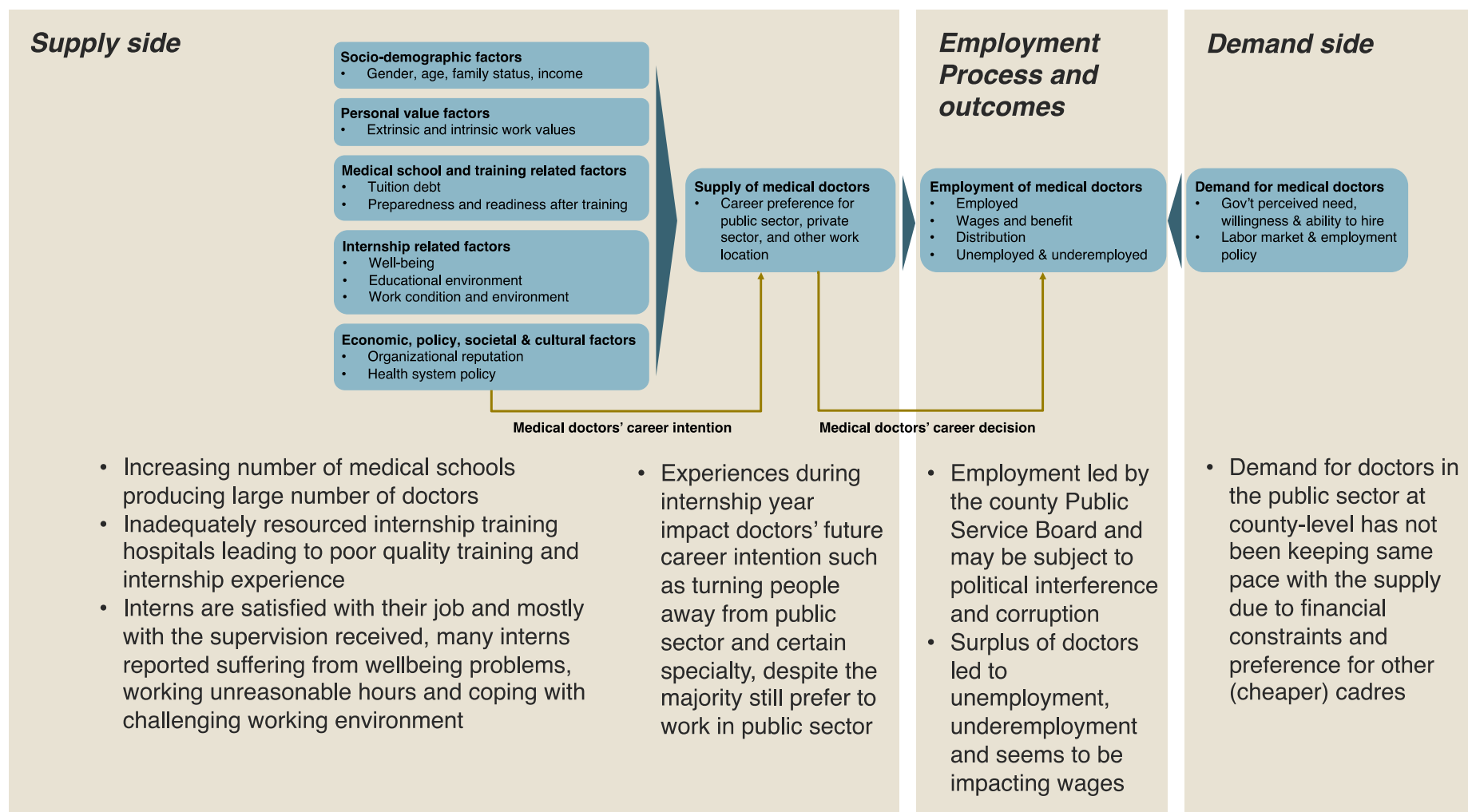


Figure 18. Major findings informed by the conceptual framework

Demand for medical officers

On the demand side, severe fiscal resource constraints limited county governments' ability to finance health workforce recruitment as shown in Chapter 6. County governments fund their spending through inter-governmental transfers from the national level, and their own revenues that are raised locally (286). However, they are still constrained by policies to spend less than 35% of county revenue on personnel emoluments (271). This contrasts with other public services such as the police and teachers who are still overseen and funded nationally (287,288). While government spending on health has increased from US\$ 17 per capita in 2010 to US\$ 38 in 2019, it has stagnated in terms of total government spending (7.3% in 2010 and 8.3% in 2019) (60,61), significantly lower than 15% pledged in Abuja Declaration (289). Therefore the overall fiscal space for health is rather limited. HRH is the largest sector devolved to county governments comprising the largest group of county personnel and is also a huge expenditure for them. Without considering staff directly employed by the national government stationed in national referral hospitals, personnel emoluments already summed up to Ksh 80,250,661,826 (~ US\$ 655 million) across 47 counties in FY2019/2020, roughly 63% of the total counties' health budget and 18% of the total counties' budget (97). In some counties the proportion of personnel emoluments out of the county health budget is as high as 78% (97), especially in those counties that inherited the "provincial hospitals" with larger staff establishments in pre-devolution times. Despite these counties receiving conditional grants this is far from adequate. So far there has not been much discussion on whether counties could "share" these hospitals to meet more specialist service needs and share relevant costs.

It's also worth considering what should the demand for MOs look like in Kenya. While recruitment was said to be preceded by needs assessments, the national guideline for staffing norms and standards derived from the globally used and WHO-recommended WISN approach, is perceived as not helpful since the target is high and unachievable as illustrated by county managers. Using the information from Table 4, even the most modest scenario for gap analysis would require doubling the current wage bills and is nearly impossible to achieve. Based on the HRH mid-term review data based on the perceived workforce required, Kenya would require at least an additional Ksh 79,934,204,532 per year (~ US\$ 642 million, or Ksh 17 billion or US\$ 133 million for MO, Ksh 16 billion or US\$ 125 million for CO and Ksh 46 billion or US\$ 359 million for nurses) to cover the workforce gap. When compared with the HRH norms and standards that require at least two MOs in Level 3 comprehensive health centres and at least 17 for Level 4 hospitals (76), the additional wage bills for MOs alone would sum up to Ksh 37 billion (~ US\$ 278 million), a 42% increase in current overall HRH spending. Also health workers can only function with the right tools and support such as adequate supply of medicine and supplies, and functioning equipment which are often lacking in lower-level facilities. (1,4) Therefore the financial demands would be even higher if needed infrastructural investments were also made to match the HR needs.

Traditional need-based and utilisation-based HRH planning approaches are helpful as a starting point, approaches used in Kenya to develop its staffing norms and standards. However economic considerations and financial feasibility need to be factored into workforce planning to make it truly practical and useful, instead of “wishful thinking” (290). For example, Kenya could leverage experiences from other countries like Thailand (291) and

Uganda (292) where cost and budget thinking have been used alongside other demand and supply parameters to facilitate workforce and service delivery planning.

More broadly, these findings also prompted some thinking on the role of MOs and opportunities for task sharing in the Kenyan setting, especially for lower-level facilities such as Level 3 and 4 facilities. In Kenya, task sharing is widely used and acknowledged according to regulations (293,294). As described in Section 1.3, clinical officers in Kenya take on many diagnostic and clinical functions of doctors and are entitled to prescribe and perform minor surgeries according to their scheme of service (295), and nurses are also legally allowed to prescribe selected drugs for acute and chronic illness mostly related to HIV/AIDS and tuberculosis in primary care settings (296). In lower level facilities de facto task sharing is prevalent due to the shortage of workforce (294). My study suggested that counties prefer to employ COs and nurses as their salary costs are roughly one-third of MOs and they can work in both higher-level hospitals and lower-level health centres and dispensaries. If lower-level facilities do not have basic infrastructure and equipment such as a theatre to justify the employment of MOs, should potential tasks be shifted to or shared with lower cadres? And should the demand for MOs consider better skill mixes and task sharing accordingly? A balanced approach is needed so that health workers' skill level, resource availability and service delivery scope are all considered for HRH planning.

[Employment process](#)

Chapter 6 provides an overview of the recruitment process in Kenya's county-level public sector. It suggested that the process is led by the county Public Service Board, may be subject to political interference and corruption and with some claiming that the public

service board lacks a full understanding of the health sector – also shown in other literature (64,93). The county Department of Health was involved only during the initial request for new employees and during interview processes as technical experts. The health facility managers are not otherwise directly involved in the recruitment process. This echoes the findings from other priority setting work in Kenya suggesting the misalignment between planning and budgeting process and that political interests greatly influence the budget allocation and HRH priority setting decisions (66,297). Additionally, MOs felt that the recruitment process is often interfered with by corruption and politics where some are asked for bribes when applying for jobs, or only people from the local county are likely to be hired. Similar political interference and discrimination in HRH management have also been reported in some counties in Kenya (64).

Employment outcome

Chapter 6 also presents the employment outcomes in the public sector at county-level. As shown in Figure 1, employment outcomes such as wages, benefits and distribution are shaped by a number of different factors such as supply and demand, labour market policy and management incentives. While Kenya has boosted its MO supply through expansion of medical training (which is still not yet adequate to reach the country's goal listed under its norms and standards), the demand for MOs in the public sector increased at a much slower speed due to the lack of sustained financial commitments for HRH and preference for other healthcare cadres. The (relative) surplus of MO supply led to huge MO unemployment and underemployment. Only 45% (825/1,800) of newly qualified and registered MOs were employed in the public sector (39), and many were unemployed or underemployed (e.g. working on a locum basis for the private sector) leading to wasted investment. Even for

those who are absorbed by the public sector, some were given fixed-term contracts as short as 6 months. What's even more concerning is that the excess supply also led to disturbed market equilibrium as the private sector started to exploit MOs and give worse salaries and remunerations with shorter contracts and poor job security, commonly seen in other contexts of decentralisation and privatisation when not well regulated and coordinated (275). Additionally, there is the challenge of health workforce out-migration as a result of unemployment and underemployment leading to brain drain and lost investment from training. There are similar concerns for unemployment and underemployment for COs and nurses in Kenya. Careful consideration of the supply/demand mismatch challenge is urgently needed to prevent the further exacerbation of these employment outcomes.

7.2. Policy recommendations to improve internship training and labour market transition in Kenya

The current systems of MO production and labour market transition is failing, specifically failing the medical graduates and the citizens. The educational institutions are benefiting through tuition fees and government subsidy, and the private hospitals are benefiting as they are able to recruit MOs at a low cost and on poor terms and conditions having made no investment in their training. This also creates inequity problems as the government is subsidising the private sector that the poor cannot reach due to financial barriers (70). Kenya needs to take a more strategic approach to match the demand and supply of physicians, especially at the labour transition period, as poor planning and management not only wastes resources and undermines healthcare but can also be detrimental to individual physicians. Based on the key challenges and opportunities summarised above, I hereby offer

five policy recommendations aiming at improving internship training and labour market transition for MOs and more broadly for HRH in Kenya.

Constructive policy dialogue between different stakeholders for effective workforce planning and re-thinking the role of medical officers

To start with, constructive policy dialogue between different stakeholders in different sectors is urgently needed to improve workforce planning, recruitment and management. Such multi-ministerial and stakeholder discussions should include supply-side stakeholders such as the Ministry of Education and all medical schools to reconsider medical students' intake. It also needs to include the demand-side stakeholders with MOH, Ministry of Finance, county health and public service departments and Kenya Health Professions Oversight Authority. Together there is a need to conduct fiscal planning, expand the fiscal space for HRH and prepare achievable and routine workforce and costing plans. KMA, KMPDC, KMPDU as well as facilities should all be included in these dialogues to discuss options with employment terms and arrangements. Currently, the discussion of a potential "Kenya National Health Service Commission" is ongoing with the proposed function of further centralising training, recruiting, deploying, transferring and disciplining the health workforce (281). This could be one potential option for addressing some of the workforce challenges, especially related to wage ceilings at county-level and problematic recruitment processes – however, it should also be acknowledged that centralisation of HRH management is not without challenges, especially related to maldistribution and absenteeism as seen pre-devolution (99,282).

Another option could be further limiting medical student intakes, but ensuring good internship experiences, as well as securing their post-internship employment, i.e. matching the supply with demand, to ensure that investment during training isn't wasted and there won't be huge unemployment and underemployment issues. Stakeholders should also leverage experiences from other LMICs like Thailand where health workforce planning have been carefully conducted and corresponding strategies put into place at different development stage to address workforce challenges (291,298,299).

More importantly, MO planning must be considered alongside broader workforce planning for specialists, nurses, clinical officers and other cadres. The MOH needs to consider developing more practical staffing norms and planning tools to assist county governments in projecting their workforce number and skill-mix required, especially regarding potential task sharing between different cadres. Careful, strategic thinking on the mix of cadres, their roles, regulation, financing and training and supervision and management of teams and services are needed (300–302). The MOH, KMPDC and training institutions also need to enable changes in education, legislation, policy and financing well in advance of the future expansion of service scope and scale as producing the desired mix of professions and skills may take years or even decades (300,301). If HRH continues to be managed just at the county level, broader discussion on expanding the fiscal space for health workforce through increasing total health spending and policy dialogues to re-engineer legislative restriction on counties' wage ceiling is also needed to enable increases in HRH numbers (303). Counties should also strengthen their priority setting process, especially the planning and budgeting process to ensure the efficiency of the limited resources available (297).

Regular audit and re-accreditation of internship hospitals against the national guideline

The KMPDC requires all internship training centres to maintain the minimum requirement of staff, and be able to offer a core set of quality services with self-report against such requirements at least once a quarter. Data from the KHFA and from qualitative interviews suggested that many internship hospitals in Kenya might not continuously achieve these minimum requirements, with challenges spanning shortage of consultants and supervisors to lack of diagnostic facilities and decent accommodation. Therefore, more stringent and regular audits and re-accreditation of internship training centres by the regulatory council is one means to ensure that only the hospitals that meet the minimum requirements are allowed to receive and train interns. Such a requirement could potentially motivate counties to correct deficits and employ and absorb more MOs and specialists if they would like to receive MO interns, a key and “free” source of workforce for the county. It might be useful to integrate this as part of joint health inspections coordinated by the Kenya Health Professions Oversight Authority, and bring together different regulatory authorities and MOH to improve compliance (304).

There also needs to be more monitoring and planning of the newly added requirement of psychiatry and community health rotations based on the national guideline. Data from the KHFA suggested that most hospitals do not have the capacity for providing such training. According to qualitative interviews, these specialties were often overlooked or even denigrated by consultants and internship coordinators. Additionally, while some interns would like to have sufficient exposure to all different specialties to assist in their future career planning, there is the tension that further shortening the training in four major specialties could compromise interns’ competence which is already raised as a concern by

consultants. The MOH and KMPDC should continue monitoring these hospitals' capacity and consider different options for psychiatry and community health rotations. If expanding these specialties is a policy priority then hospitals must be adequately resourced. Interns may need even more support to acquire all the skills needed in shorter rotation.

Alternatively, it may be that extending the internship training length is needed or that special post-internship tracks on psychiatry and community health could be developed in selected hospitals for those who are interested, perhaps alongside other emerging interests and needs like public health and health care management.

Improve mental health and career counselling opportunities for medical interns and junior medical officers

The transition from medical student to junior doctor is stressful and over half of the medical interns surveyed experienced wellbeing problems including signs of stress, anxiety and burnout. More emphasis should be given to improving interns' wellbeing. While the MOH operates a tele-counselling and psychological care hotline (initiated during the COVID pandemic) this wasn't mentioned by any interns. Stakeholders such as the MOH, KMPDC, the Kenyan Medical Association, the Kenya Medical Practitioners and Dentists Union (KMPDU) and internship hospital administrators should consider more ways to improve interns' wellbeing from both a whole-system and individual level (305,306). On a system level, internship coordinators should be trained on how to better lead and support interns' health and wellbeing, including promotion of mental health awareness, being able to respond to interns' health and wellbeing challenges, and more broadly improving learning and working environment such as preventing workplace bias and bullying (305,307). Additionally, different stakeholders mentioned above could consider establishing

psychologist-facilitated support groups, counselling centres or peer support groups to help interns cope better (28). Such system improvement could also involve other cadres such as junior MOs, clinical officers and nurses that have similar experiences. On an individual-level, based on recommendations from MO interns themselves, training institutions should also consider adding resilience and coping strategies as part of the undergraduate pre-service curriculum to better help these junior MOs prepare for internship. Leveraging and adapting experiences from other countries including high-income countries could be helpful for this area though it should be acknowledged that there is no one-size-fits-all solution and some of the interventions, like Schwartz Rounds, have not yet been piloted in LMICs (307–310).

Additionally, the above stakeholders should also provide better career counselling services for medical interns. For career options within public and private sectors, the current source of specialty advice primarily came from supervisors and consultants during internship which could be subject to bias when consultants bash certain specialties and career choices.

Rapidly changing specialty training policies (such as increased school fees) and anecdotal information on county government needs (thus higher likelihood for sponsorship) also influence interns' decision and made them stressful. For non-clinical career options, many thought working in research is the only acceptable option, and better understanding of the available career pathways such as in business, public health and non-profit management would be helpful for some, especially considering the large proportion of interns who cannot be absorbed by the public sector post-internship. Furthermore, rapid changes in employment and training policies bring additional stress to these junior doctors, more up-to-date and better career advice should be in place to reduce MO interns' worry and better support them in making career decisions. These career counselling services could be

provided as early as in pre-service training by medical schools but would be needed during the internship period, and more conversation is needed amongst major stakeholders on who should lead on such initiative.

Strengthen the mentorship and supervisory accountability and improve professional behaviour and conduct

Many internship training centres lack adequate number of consultants to supervise interns and often these consultants are not available at all times. While many interns were satisfied with the supervision received, and did not experience discrimination or bullying, there were cases from my qualitative interviews that highlighted that bullying and racial discrimination existed in some facilities. “Added weeks” where consultants could ask interns to repeat some rotations in a certain specialty and work additional weeks outside of the 12-month internship to regain skills, were thought of as subjective and punitive decisions. Additionally, some supervisors and internship coordinators intentionally or unintentionally looked down upon or denigrated certain specialties and career choices that had negative impacts on interns’ career preferences. On the consultants’ side they did not receive any support or rewards for supervision, further limiting their capacity and motivation for supervision.

Therefore, MOH and KMPDC should first ensure that all internship training centres have enough consultants to provide supervision as mentioned above in regular audit and re-accreditation. Furthermore, they should consider providing more training, support or even financial incentives to supervisors and internship coordinators on how to better supervise and support interns. They should also improve and regulate supervisors’ professional behaviours and conduct to create a better learning environment for interns, for example

preventing workplace bias and bullying, improving inter-professional teamwork, fostering open communications and creating safe spaces to speak-up. These should be built in as part of management and leadership skills for internship coordinators and supervisors and broader hospital administration, which not only would be beneficial for improving internship experiences but also patient safety and service delivery quality (311).

Track and monitor medical doctors' training experiences, career intentions and decisions

My current work provided a snapshot of junior medical officers' internship experiences and career intentions. While the questionnaire survey and qualitative interviews highlighted specific challenges for interns, these tools could be administered by KMPDC as an internship exit survey or pre-licensure survey annually, similar to the UK GMC National Training Survey (151) and the US ACGME resident/fellow survey (153)), to monitor and report on the quality and experience of medical education.

Longitudinal health workforce cohorts could also be helpful to understand doctors' career intentions, decisions and experiences. Most US states operate a license-based survey system that requires doctors to report their practice location and characteristics upon their license renewal (312). Other LMICs such as Thailand have also established similar cohorts to monitor employment characteristics and health status (313). MOH and KMPDC could use the proposed internship exit survey as a baseline for the cohort and further explore how these training experiences impact doctors' long-term career planning, which will also be useful for effective workforce planning; and also use this as a source of feedback on internship training environment including strengthening hospital capacity and improve accountability.

7.3. Comparison and contribution to the global literature

My study further contributed to the global literature on medical internship experiences. The scoping review (Section 4A) highlighted the scarcity of quantitative surveys that focused on internship experiences in LMICs with only three studies from Africa (i.e. Malawi (314) and South Africa (29,54)). These studies are much smaller in scale (less than 100 participants) but highlighted challenges regarding supervision, resources and infrastructure. More recently in May 2022, Makerere University in Uganda published its first Internship Situation Analysis Survey Report which surveyed 499 medical, dental and nursing interns in the country and interviewed 34 key informants, especially supervisors and patient representatives as well as focus groups with interns (315). Its findings highlighted specific challenges related to lack of equipment and materials, unavailable supervisors or inadequate support provided, as well as high levels of stress during internship (315). Most of the interns had moderate to severe stress based on the Perceived Stress Scale, citing work, finances, unclear future and the poor work environment as common reasons for stress (315). These study findings are largely in line with my results in Kenya. As explained in the following section, with our developed and validated tool I am hoping that more LMICs could conduct internship experience surveys and further acknowledge and highlight these common challenges during internship.

Findings in Chapter 5 also contributed to the wider literature on careers linking with identity theory. From interns' individual perspectives, I decomposed how potential professional identities are formed based on their internship experiences, which is largely in line with Markus and Nurius' "possible selves" theory (256) and Ibarra's "provisional selves" theory

(257). While this is not the first application of these theories to medical graduates' career choices, as others have used these to explain medical students' specialty choices in the US (316), I developed a conceptual model with three themes and specific categories capturing how internship experience shapes medical doctors' career intentions/decisions, and tested this out in an LMIC setting. These theories and my conceptual framework could be important for educators and policy makers when designing policies or interventions to attract doctors to less popular specialties or work locations where they are most needed.

These findings also prompt thinking on service delivery arrangements and quality of care. Interns are rarely studied as a professional category, while often they are the front-line service provider in LMICs. For example in Kenya patients are rarely admitted by fully qualified MOs but predominantly by MO interns (46%) and diploma-level CO interns (41%) (136). Although I did not specifically investigate the competence and skills of interns, clearly the poor working conditions and lack of adequate supervision inevitably threaten patient safety and service quality. More research is needed to explore interns' role in service delivery and quality, and future health service interventions should consider interns as a separate category instead of ignoring them or combining them with fully qualified doctors.

Most importantly, the findings on labour market dynamics ring the alarm for the discussion on the global shortage of HRH. While many LMICs face an absolute shortage of health workforce stock, LMIC governments and technical bodies tend to focus on scaling up education and training of health workers (317,318). However evidence from my thesis and other LMICs suggest that such production expansion is not carefully planned and managed and often not accompanied by demand side expansion, leading to HRH underutilisation.

Rapid scaling up of medical training may impair its quality if there is limited infrastructure and faculty capacity in newer medical schools (319) as well as newer internship hospitals. Accreditation processes are rarely standardised and enforced, especially with the newer private sector institutions (320). Second, there is a lack of information on where these newly produced medical doctors are heading post-graduation. Educational institutions are not responsible for their post-training employment and Ministries of Health do not have accurate data on their HRH numbers and distributions, especially related to private sector employment. HRH data from Kenya showed a huge discrepancy between different data sources despite all of them claiming to represent the same indicator (total number of the different professionals across public, private and faith-based facilities). Similarly a recent survey with 47 Ministries of Health by the WHO Regional Office for Africa suggested that based on countries' national HRH information systems, only 3.8% of general physicians work in the private for profit sector, 16.4% in the private for non-profit and 79.9% in the public sector (321). This seems unlikely to be true, at least based on Kenyan experience, but highlights the challenge with existing HRH data and information systems.

For countries with more accurate data, the supply/demand mismatch challenge is often prominent with growing health workforce underutilisation and unemployment (322). Recent news suggested that there are 4,000 unemployed doctors in Kenya and a junior doctor committed suicide in 2023 as he struggled to get a job (323). In Lesotho nearly one third of nurses and midwives are unemployed and financial space analysis suggested that there is insufficient funding to absorb all health workers (324). It's high time for countries to re-think their HRH shortages and what are the causes of the shortages. Is this a gap between health worker needs and stock? Or is this a deficiency in funding where available health workers

are being unemployed? Simply increasing HRH production is not the solution in Kenya where my findings suggest unintended consequence of disturbed market equilibrium including that the private sector can exploit MOs as well as medical unemployment. While anecdotal evidence suggests that this is also true for Uganda, Tanzania and other African countries, more country-specific in-depth research evidence on the supply/demand mismatch dilemma is needed to draw policymakers' attention to this issue. Meanwhile, WHO and other organisations should also turn their focus to ensuring countries improve their HRH and labour market planning as well as increase fiscal space for HRH. In Kenya one immediate strategy is to remove the county wage bill ceiling through legislative reforms (303).

7.4. Summarising the sets of tools and frameworks developed from the study

One additional aim of the thesis is to develop a set of frameworks and tools on internship experience, career transition and absorption that are applicable and could be adapted for all LMICs. I hereby summarise three sets of tools and frameworks and discuss their generalisability, transferability and potential adaptation.

Medical internship experience scale

I developed and validated a scale to measure the internship experience of medical doctors in LMICs. I tested for its reliability, factor structure and validity across four languages and different countries varying in internship training contexts. The final six-factor scale shown in Table 22 includes 50 items that broadly cover six major constructs, i.e. clinical learning and supervision, patient safety, job satisfaction, stress and burnout, mental wellbeing, fairness

and discrimination. The focus of the tool broadly aligns with other existing tools that assessed internship experiences based on the scoping review (Section 4A) and could be used to inform better internship planning and management.

The scale and its items should be relevant to all LMICs and could be used to compare internship experiences across facilities and time, as shown in Figure 14. When using the scale to understand internship experiences, others could also conduct pilot testing and cognitive interviews to ensure all questions are relevant, especially if it is translated into a new language. Others could also add new questions specific to their settings including items on salaries, remuneration and resource availability, and potentially use it for dentists, pharmacists and non-physician clinician cadres. However, it should be noted that the less than satisfactory metric invariance and scalar invariance suggest that the factor loading and item intercepts could be different in different countries. Therefore comparing the results such as aggregate scores across different countries requires extra caution and the scale itself might benefit from further testing and development.

Template for understanding internship hospital capacity using secondary data

I used secondary data i.e. the Kenya Harmonised Health Facility Assessment to characterise Kenyan internship training hospitals' capacity. 166 indicators were selected to examine internship hospitals' capacity in human resources, diagnostics and supportive care, service continuity and safety as well as major specialties (see Appendix 7). Health facility assessments such as the Service Provision Assessment (SPA) and Service Availability and Readiness Assessment (SARA) are widely employed across many LMICs. While the internship training minimum criteria and the actual survey questions are different across settings, my

analytical process and the indicators selected could serve as a template for others to examine internship hospital capacity using secondary sources without collecting primary data which is costly. Additionally data focusing on process or outcome indicators e.g. training or patient outcomes could be linked to understand for example whether these structural issues also lead to poor patient outcomes.

Internship experience and career intention analytical framework

From a meta-ethnographic review, I developed a conceptual model to illustrate the journey of career intention/decision making during the internship period and how experiences during the internship appear to significantly influence medical doctors' career intentions and decisions (Figure 16). The conceptual model has been subsequently tested out in a Kenyan population and proved to be relevant. Others could use this framework to guide their research design and analysis when trying to link up internship experiences and career intention in different settings including high-income countries, or further develop career transition-related theories.

7.5. Limitations and future research

While most of the limitations are linked with the study design and have been addressed in each chapter, two additional limitations are worth mentioning. First, most of my research activities were conducted during the Covid-19 pandemic. The majority of qualitative interviews with MOs and consultants were conducted online primarily by a research assistant Daniel Mbutia with my facilitation. Covid-19 itself also impacted the internship training context, doctors' experiences and career-seeking experiences. For example, some internship hospitals were better equipped during Covid-19 (147) and some interns

experienced an increased workload managing Covid-19 patients while others had fewer patients and elective procedures as general outpatient service utilisation decreased (132). In some counties the governments employed fixed-term contract doctors with a contract as short as 6 months under the Covid-19 emergency hiring scheme which is different than the usual employment schemes. Therefore, the respondents' experiences of internship could be slightly different than the typical internship experiences in non-Covid-19 times.

Second, I only focused on specific components of the labour market framework in my thesis due to time and resource constraints. Other broader issues such as individuals' personal values and public service motivations and the broad socio-political environment also impact medical interns' future career preferences. On the demand side I only focused on public sector demand as the majority of hospital services are still provided through this sector, especially to the poor and those in rural areas. The private sector, faith-based sector as well as recruitment and migration to other countries may also play an important role in shaping labour market dynamics. I also did not examine distribution between counties and the implication for equity of the workforce, especially for remote and hardship areas where counties could likely struggle to attract and recruit MOs. I also acknowledge that while medical training is primarily aimed to prepare people for clinical practice, trained individuals could have wider roles within the health system such as in research, public health and health management, and some of the un-absorbed MOs could have been working in public health and research. On the recruitment process I was not able to further explore the issues of ethnicity and corruption. I also did not investigate the effect of gender in this thesis. Future studies should expand on my work and explore other components of the framework.

7.6. Conclusion

Kenya has a severe shortage of medical officers even in its larger public hospitals. The problem of workforce shortages is complex and ensuring a sufficient workforce requires careful planning and matching the supply and demand. As the majority of hospital care provided to the population is still provided through the public sector, it is important that governments are able to recruit and retain adequate numbers of qualified physicians. However, only 46% of the medical officers graduating between 2015 and 2018 were absorbed by the public sector soon after completing their internship and gaining a license to practice. In this thesis, I investigated the challenges relating to internship training and subsequent licensing and employment of doctors in Kenya. Using quantitative and qualitative methods, literature reviews and empirical studies, I found that the overall staffing, equipment and service availability of Kenyan internship training hospitals was inadequate when compared with the regulator's requirements, especially for smaller Level 4/district hospitals. Over half of the medical officers reported features indicative of burnout and anxiety during their internship, some did not have good supervision at all times and had to perform inappropriate tasks, and over half reported that their hospitals did not have enough consultants, physical resources and supplies of diagnostic, equipment and medication required for their study and work. All concerns were more common in Level 4 smaller hospitals. Despite the challenges with internship in Kenya the majority of young physicians still prefer to gain work in public sector hospitals and many hope to continue with specialist training immediately after internship. A small proportion of these young physicians prefer to work in the private sector, migrate to other countries, or leave clinical practice.

While many interns wish to remain in the public sector, decentralisation in 2013 led to 47 devolved county governments responsible for local workforce planning and recruitment. They are not absorbing newly trained physicians into the public sector. This is because of: i) limited financing provided by central government, ii) comparatively high wage bills of physicians, iii) a reliance on interns rather than qualified and licensed practitioners to provide hospital care, and iv) preference for recruiting other lower and cheaper cadres including nurses and casual workers. I argue that Kenya needs to take a more strategic approach to match the demand and supply of physicians, especially during the labour transition period, as well as improve internship training resources and capacity. Poor planning and management not only wastes resources and undermines healthcare but can also be detrimental to individual physicians.

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Appendices

Appendix 1. Ethics and research approvals

Oxford Tropical Research Ethics Committee

University of Oxford
Research Services, University Offices
Wellington Square, Oxford OX1 2JD
Tel. +44 (0)1865 (2)82106
E-mail: oxtrece@admin.ox.ac.uk



Yingxi Zhao
Nuffield Department of Medicine
HB Allen Centre
25 Banbury Road
Oxford
OX2 6NN

17 November 2020

Dear Yingxi,

Full Title of Study: Examining human resources for health management practices and their consequences in Kenya

OxTREC Reference: 563-20

Thank you for your email of the 12 November 2020, and for your minimal risk application form.

I am pleased to confirm that approval has now been granted for this study. This is valid for the first five years and is subject to receiving the local ethical approval (if this approval has not yet been received).

The documents approved for this study are as follows:

Documents:	Version:	Date:
Minimal risk application form	V3.0	10/11/20
PIS/ICF	V3.0	10/11/20
Protocol	V1.5	Sept 2020
COVID-19 mitigation plans	V1.0	03/09/20
COVID-19 risk information sheet	V1.0	19/08/20

Any subsequent changes to the application must be submitted to the Committee as an Amendment. This should include a letter to give the reasons for the proposed modifications and all revised documents with changes tracked.

Please ensure that you submit a completed Annual Report form on every anniversary of this approval and a final End of Study Report. The relevant forms can be found on the OxTREC website: <https://researchsupport.admin.ox.ac.uk/governance/ethics/apply/oxtrece>

Finally, please note the following **important information**:

Data safety—all studies

It is the responsibility of the PI to ensure that all data collected during the course of the study is stored and transferred safely and securely. Further guidance and advice is available from the

[Research Data Team](#)

Tel: +44 (0)1865 (2)82106
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Web: <https://researchsupport.admin.ox.ac.uk/governance/ethics>

Oxford Tropical Research Ethics Committee

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Ms. Yingxi Zhao
Nuffield Department of Medicine
University of Oxford

3 November 2021

Dear Ms. Zhao,

Full Title of Study: Development and validation of a multi-language "clinical internship experience scale" for low- and middle-income countries

OxTREC Reference: 518-21

Thank you for your letter of the 29 October 2021 requesting an amendment to the above study. The revised documents that you have submitted for consideration are as follows:

Documentation:	Version:	Date:
Minimal risk application form	V3.1	29/10/21
PIS/ICF	V3.1	29/10/21
Questionnaire/discussion guide	V3.1	29/10/21

I am pleased to inform you that this amendment has been approved.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Sami Kelsh".

Ms. Sami Kelsh
Research Ethics Administrator, OxTREC



KENYA MEDICAL RESEARCH INSTITUTE

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KEMRI/RES/7/3/1

September 21, 2020

**TO: JACINTA NZINGA
PRINCIPAL INVESTIGATOR**

**THROUGH: THE DEPUTY DIRECTOR, CGMR-C
KILIFI**

Dear Madam,

**RE: SERU PROTOCOL NO. 4071 (RESUBMISSION OF INITIAL SUBMISSION):
EXAMINING HUMAN RESOURCES FOR HEALTH MANAGEMENT PRACTICES
AND THEIR CONSEQUENCES IN KENYA**

Reference is made to your letter dated September 1, 2020. The KEMRI Scientific and Ethics Review Unit (SERU) acknowledges receipt of the revised study documents on September 1, 2020. The KEMRI SERU acknowledges receipt of the following document:

1. Examining Human Resources for Health management practices and their consequences in Kenya Version 1.5 dated 010920

This is to inform you that Committee determined that the issues raised during the 301st Committee C meeting of the KEMRI SERU held on **June 30, 2020** have been adequately addressed.

Consequently, the study is **granted approval** for implementation effective this day, **September 21, 2020** for a period of one year. Please note that authorization to conduct this study will automatically expire on **September 20, 2021**. If you plan to continue data collection or analysis beyond this date, please submit an application for continuation approval by **August 9, 2021**.

Please note that only approved documents including (informed consents, study instruments, Material Transfer Agreement) will be used. You are required to submit any proposed changes to this study to SERU for review and the changes should not be initiated until written approval from SERU is received. Any unanticipated problems resulting from the implementation of this study should be brought to the attention of SERU and you should advise SERU when the study is completed or discontinued.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours faithfully,

**ENOCK KEBENEI,
THE ACTING HEAD,
KEMRI SCIENTIFIC AND ETHICS REVIEW UNIT.**

In Search of Better Health



REPUBLIC OF KENYA

Ref No: 666677

RESEARCH LICENSE



This is to Certify that CENTRE FOR GEOGRAPHIC MEDICINE RESEARCH-COAST (CGMRC), has been licensed to conduct research in Bungoma, Busia, Embu, Homabay, Kakamega, Kiambu, Kisumu, Machakos, Mombasa, Nairobi, Nakuru, Narok, Nyeri, Siaya, Transzoia, Wajir on the topic: Examining human resources for health management practices and their consequences in Kenya for the period ending : 14/October/2021.

License No: NACOSTI/P/20/7141

666677

Applicant Identification Number

Walter

Director General

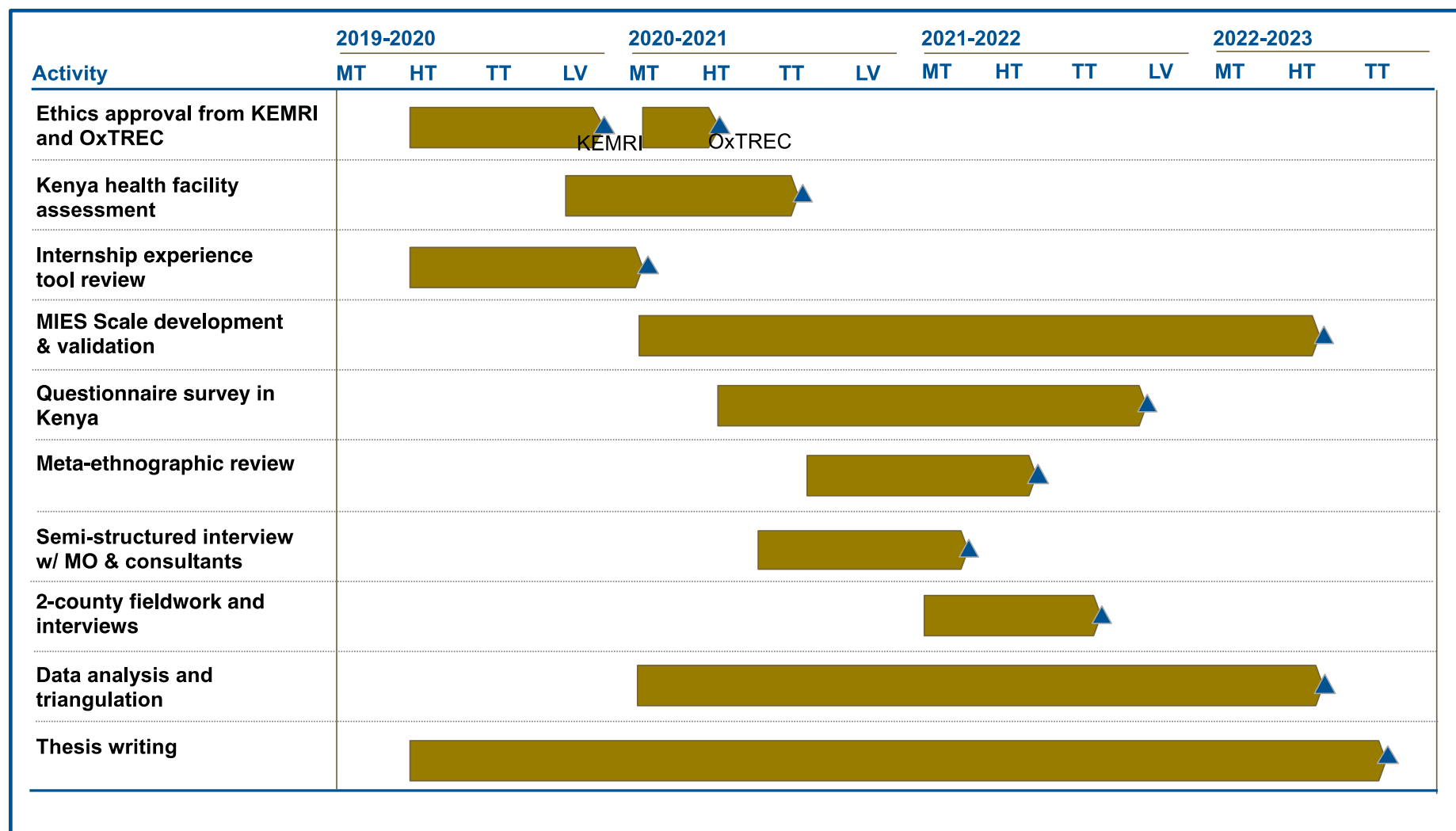
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Appendix 2. Gantt chart



Appendix 3. Number, gap and costs for different cadre health workers in Kenya

	Total number	Gap/norms	Number in training	Cost
Medical officer and specialist	- Ministry of Health Labor Market Analysis (data for 2020 from National Health Workforce Account) (1) - Specialist 4908, MO 7884 - Number by sector: 45% in public sector, 55% in private sector - Kenya Health Sector Strategic Plan Mid-term review (data for 2020 from county reporting) (2) - Specialist 1556 (county 997, and national service 559), MO 2876 (county 2600, and national service 276) - Number by level of care: Specialist (community 1, primary care 23, hospital 808); MO (community 1, primary care 85, hospital 2237) - Number by sector: Specialist (public 775, private-non-profit 86, private 136); MO (public 2341, private-non-profit 154, private 105) - HRH Strategic Plan 2019-2023 (data for 2018 from rHRIS) (3) - Registered MO & specialist (including dentists) 11651 - Public 3712, private 3914 (those are considered “active” 7626), not trackable 4025 - Health Sector HR Strategy 2014-2018 (data for 2012) (4) - MOH HIS Annual report 2012: MO 1092, specialist 419 - Annual operational plan 2011/2012/KHSSP 2013-2017 [Public only]: MO 1005 (public 603, FB 402), specialists 728 (public 477, FB 251) - Economic survey 2013: ever registered doctors 8092 - Number by level of care in public: Specialist (primary care 1, county 149, national 327); MO (primary care 55, county 342, national 206) - Kenya Health Workforce Report 2015 (5) - Ever registered doctor 9497 - MPDB renewal/active 5660, within this 2089 has speciality training	- Kenya Health Sector Strategic Plan Mid-term review (data for 2020 from county reporting) (2) - Specialist gap 2313, MO 3238 - HRH Norms & Standards Guidelines (2014) (6) - Staffing need for MO 13141, specialist 6114 (note this is final staff need, standard workload to deliver KEPH is 7650 & 1039) - When compared with 2018 rHRIS “registered” the gap is 7604, “active” the gap is 11629, “active public” is 15543 (note different year) - By facility-level: MO (50 for L5, 16 for L4, 2 for L3); Specialists (71 for L5, 24 for L4, 0 for L3) (with facility master list we can calculate gap for each facility-level) - Health Sector HR Strategy 2014-2018 (4) - General practitioners, projected active, norm and gap in 2013: 3443, 7551 vs. 4108 - In 2015: 4148, 7939 vs. 3801 - In 2020: 6051, 9038 vs. 2987	- HRH Strategic Plan 2019-2023(3) - Training output 2018 medical students 573 - Health Sector HR Strategy 2014-2018 (4) - Number in training 2008/09: 3172; 2009/10: 2437 - Expected graduate in 2013: GP 517 - Kenya Health Workforce Report 2015 (5) - New register 2015: 611	- Training cost - A 2006 study used UoN & Moi self-sponsored cost in 2005: Tuition cost totalled 2,700,000 Ksh for 6 years, living cost 720,000 for 6 years, this added to 3,420,000 (~48,169 USD); the authors also estimated primary and secondary cost and adding all those up ~65,997 USD (7) - A 2011 study estimate used UoN in 2011: Gov’t subsidised cost 2,652,500 Ksh (~32,225 USD); adding primary and secondary school ~36,453 USD (8) - For MBBS self-sponsored (searched in Dec 2020), UoN website suggested 474,000 Ksh per year – 2,844,000 for 6 years (9); Kenyatta website said 450,400 Ksh for East Africans – 2,702,400 for 6 years (10); Mount Kenya suggested 450,000 Ksh per academic year (11) - For MMed (searched in Dec 2020), UoN website suggested 179,000 Ksh for 1st year, 214,900 Ksh for 2nd-5th year (12). Supposed MMed is 3 years then 608,800 Ksh (~5,455 USD); Kenyatta suggested 130,000 for Science-based postgraduate (10) - Salary cost (monthly) (13,14) - MO interns (group L) Ksh 145,055 across 2 counties - MO (group M) Ksh 255,686 across 3 counties; Senior MO (group N) averaged Ksh 254,621 across 3 counties - Physician (group Q) averaged Ksh 345,505 across 2 counties; Physician/consultant (group P) averaged Ksh 268,630 across 2 counties
Clinical officer	Ministry of Health Labor Market Analysis (data for 2020 from National Health Workforce Account) (1)	Kenya Health Sector Strategic Plan Mid-term review (data	HRH Strategic Plan 2019-2023(3)	Training cost (search in Dec 2020)

(generalist & specialist)	○ Clinical officer 25400 (specialist 2210, generalist 23190) ○ Number by sector: 38% in public sector, 62% in private sector • Kenya Health Sector Strategic Plan Mid-term review (data for 2020 from county reporting) (2) ○ CO specialist 1424 (county 1133 and national service 313), CO general 6279 (county 6230 and national service 49) ○ Number by level of care: CO Specialist (community 0, primary care 135, hospital 926); CO (community 0, primary care 1847, hospital 2751) ○ Number by sector: CO Specialist (public 1028, private-non-profit 59, private 46); CO (public 4883, private-non-profit 936, private 534) • HRH Strategic Plan 2019-2023 (data for 2018) (3) ○ Clinical officer 20554 ○ Public 7016, private 7520 (those are considered “active” 14536), not trackable 6018 • Health Sector HR Strategy 2014-2018 (data for 2012) (4) ○ MOH HIS Annual report 2012: Clinical officer: 3208 ○ Annual operational plan 2011/2012/KHSSP 2013-2017 [Public only]: CO gen 1635 (public 1246, FB 389), spec 1086 (public 921, FB 165) ○ Economic survey 2013: registered CO 11185 ○ Number by level of care in public: CO specialist (primary care 65, county 583, national 273); CO (primary care 332, county 770, national 144) • Kenya Health Workforce Report 2015 (5) ○ Ever registered 15237 ○ COC renewal retention/active 10562, within this 1016 has speciality training	for 2020 from county reporting) (2) ○ CO Specialist gap 3970, CO general 9301 • HRH Norms & Standards Guidelines (2014) (6) ○ Staffing need for CO 16278 (note this is final staff need, the standard workload to deliver KEPH is 9188) ○ When compared with 2018 rHRIS “registered” the gap is -4276, “active” the gap is 1742, “active public” the gap is 9265 (note different year) ○ By facility-level: Diploma CO (44 for L5, 30 for L4, 6 for L3, 2 for L2 and 1 for L1); Graduate CO (7 for L5, 14 for L4, 1 for L3); CO specialists (39 for L5, 24 for L4, 4 for L3 (with facility master list we can calculate gap for each facility-level) • Health Sector HR Strategy 2014-2018 (4) ○ Clinical officer, projected active, norm and gap in 2013: 7043, 15447 vs. 8404 ○ In 2015: 9656, 16261 vs. 6696 ○ In 2020: 16021, 18488 vs. 2466	○ Training output 2018 clinical medicine students 2771 • Health Sector HR Strategy 2014-2018 (4) ○ Number in training 2008/09: CO 1509; 2009/10: 1076 ○ Expected graduate in 2013: CO 1564 • Kenya Health Workforce Report 2015 (5) ○ New register 2015: 1395	○ KMTC self-sponsor 120,700 Ksh per year (3 year 362,100 Ksh ~3245 USD), regular 80,700 Ksh (15) ○ For diploma, Mount Kenya suggested 56,000 Ksh per trimester – 504,000 Ksh for 3 years (~4,517 USD) (11) ○ For BSc, Mount Kenya suggested 108,600 per semester (8 semester) – 868,000 Ksh (~7,788 USD) (11) ○ For Master, Mount Kenya suggested 104,500 Ksh for 6 semester - 627,300 Ksh (~5,623 USD) (11) • Salary cost (monthly) (13,14) ○ Registered CO (group H) averaged Ksh 89,553 across 3 counties; Registered CO (group J) Ksh 101,120 across 3 counties; Registered CO (group K) averaged Ksh 109,994 across 5 counties ○ Senior Registered CO (group L) averaged Ksh 132,040 across 3 counties; Anaesthetist CO (group L) averaged Ksh 155,110 across 2 counties ○ Chief CO (group M) Ksh 157,510
Nurse & midwives	• Ministry of Health Labor Market Analysis (data for 2020 from National Health Workforce Account) (1) ○ Registered nurse 71539, enrolled nurse 38120 ○ Number by sector: 81% in public sector, 19% in private sector • Kenya Health Sector Strategic Plan Mid-term review (data for 2020 from county reporting) (2)	• Kenya Health Sector Strategic Plan Mid-term review (data for 2020 from county reporting) (2) ○ 38548 • HRH Norms and Standards Guidelines (2014) (6)	• HRH Strategic Plan 2019-2023(3) ○ Training output 2018 nursing and midwives 4183	• Training cost ○ A 2008 study used UoN & Moi self-sponsored cost in 2005: Tuition cost totalled 1,200,000 Ksh for 5 years, living cost 600,000 for 5 years, this added to 1,800,000 Ksh (~25,352 USD); the authors also estimated primary and secondary cost and adding all those up ~43,180 USD

○ Nursing staff 32666 (county 28798 and national service 3919), KRCHNs 24191 (county 20872 and national service 3534), KECHN 8475 (county 7924 and national service 385) ○ Number by level of care: community 355, primary care 11581, hospital 14372 ○ Number by sector: public 25770, private-non-profit 1635, private 1393 • HRH Strategic Plan 2019-2023 (data for 2018) (3) ○ Nurse (& midwives) 80973 ○ Public 29706, private 28069 (those are considered “active” 57775), not trackable 23198 • Health Sector HR Strategy 2014-2018 (data for 2012) (4) ○ MOH HIS Annual report 2012: Nurse and midwives: 20371 ○ Annual operational plan 2011/2012/KHSSP 2013-2017: RN (public 5098, FB 2162), EN (public 9906, FB 2397), BSN (public 2071, FB 1273) ○ Economic survey 2013: RN 35148, EN 26621, BSc nursing 1532 ○ Number by level of care in public: BSN (community 1, primary care 58, county 323, national 1689); RN (community 5, primary care 1192, county 2122, national 1779); EN (community 18, primary care 4840, county 3797, national 1251) • Kenya Health Workforce Report 2015 (5) ○ Ever registered 51649 ○ NCK renewal 2013-2015: 31896, within this 1736 has speciality training	○ Staffing need for nurse 38315 (EN 23574, RN 11335, BSN 467, SN 2939), for midwives (RM) 13308 (note this is final staff need, the standard workload to deliver KEPH is 20555 and 5847) ○ When compared with 2018 rHRIS “registered” the gap is -29350, “active” the gap is -6152, “active public” the gap is 21917 (note different year) ○ By facility-level: BSN (12 for L5, 4 for L4); RN (80 for L5, 20 for L4, 2 for L3); Registered community health nurse (260 for L5, 50 for L4, 8 for L3, 2 for L2, 1 for L1); EN (10 for L5, 6 for L4, 4 for L3, 2 for L2); Enrolled community health nurse (250 for L5, 100 for L4, 12 for L3, 4 for L2, 1 for L1); specialist nurse (230 for L5, 71 for L4, 9 for L3) (with facility master list we can calculate gap for each facility-level) • Health Sector HR Strategy 2014-2018 (4) ○ Nurse, projected active, norm and gap in 2013: 34318, 75407 vs. 41026 ○ In 2015: 38911, 79379 vs. 40468 ○ In 2020: 54564, 90249 vs. 35685	• Health Sector HR Strategy 2014-2018 (4) ○ Number in training 2008/09: RN 1847; 2009/10: 1989; 2008/08 BSN 731; 2009/10: 818 ○ Expected graduate in 2013: nurse 3768 • Kenya Health Workforce Report 2015 (5) ○ New register 2015: 2941	○ KMTC (searched in Dec 2020) suggested self-sponsor 120,700 Ksh per year (3 year 362,100 Ksh ~3245 USD), regular 80,700 Ksh (15) Certificate 2.5 years 301,750 Ksh ○ For diploma (searched in Dec 2020), the Nairobi Women’s Hospital college suggested 130,000 Ksh per year for tuition as well as other mandatory statutory fee adding up to 405,000 Ksh (~3,629 USD) (16) ○ For BSc (searched in Dec 2020), Mount Kenya suggested 101,300 per trimester (12 trimester) – 1,215,600 Ksh (~10896 USD) (11) ○ For Master (searched in Dec 2020), Mount Kenya suggested 100,000 Ksh for 2 years, and 100,000 research and clinical attachment - 500,000 Ksh (~4481 USD) (11); UoN said 553,000 Ksh for two years (~4,954 USD) (17) • Salary cost (monthly) (13,14) ○ Enrolled nurse (group G) Ksh 87,140 in 1 county; (group H) Ksh 91,840 in 1 county; (group J) Ksh 97,323 in 3 counties; (group L) Ksh 125,130 in 3 counties ○ Registered nurse (group H) Ksh 80,860 across 4 counties; (group J) Ksh 100,515 across 4 counties; (group K) Ksh 122,544 across 4 counties ○ KRCHN (group G) Ksh 58,420 in 1 county; (group H) Ksh 83,880 in 2 counties; (group J) Ksh 80,950 in 1 county; (group L) Ksh 135,960 in 1 county ○ NO (group H) Ksh 73,430 in 1 county; (group J) Ksh 97,460 in 1 county; ○ NO 1 (group K) Ksh 104,120 in 1 county; (group L) Ksh 127,383 in 3 counties; (group M) 148,510 in 3 counties
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Appendix 4. Kenya junior doctor internship experience survey questionnaire

Identification #

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Please fill out this page together with the survey distributor.

#	Question	Enter or circle your answer
O1	What of the following best describe your current role?	1 = Medical student (I have not yet started my internship) 2 = Intern → Please answer O2 3 = Medical doctor (I have finished my internship) → Please answer O3
O2	How many months of internship training have you completed?	(mm)
O3	When did you finish your internship training?	(yyyy)
O4	Which medical school did you attend for your medical training (Bachelor of Medicine and Bachelor of Surgery degree programme or its equivalent)? (Circle one category)	1=University of Nairobi 2=Moi University 3=Kenyatta University 4=Egerton University 5=Kenya Methodist University 6=Maseno University 7=Jomo Kenyatta University of Agriculture and Technology 8=Mount Kenya University 9=Uzima University 10=Maseno University 11=Masinde Muliro University of Science and Technology 12=Kisii University 13=Outside of Kenya _____ 14=Others _____
O5	Which internship training centre are/did you attend for your internship? (Enter your response)	County name: _____ Facility name: _____

The questions in this section will ask you about your feelings and thoughts during your internship year(s). It also ask about your experiences, both positive and negative, as a helper: When you help people, you have direct contact with their lives. As you may have found, your compassion for those you help can affect you in positive and negative ways.

Please reflect on your whole internship experience in all department rotations rather than your current department rotation.

Please circle how often you felt or thought a certain way.

	During your internship year, how often do you experience these feelings or thoughts?	5 = Very Often	4 = Often	3 = Someti mes	2 = Rarely	1 = Never	Don't know/ Prefer not to say
Q1	I feel that I am unable to balance my work and personal life during my internship.	5	4	3	2	1	X
Q2	I feel nervous and/or stressed because of my internship work.	5	4	3	2	1	X
Q3	I feel confident about my ability to handle my personal problems during my internship.	5	4	3	2	1	X
Q4	I have felt that things have not gone my way in my life.	5	4	3	2	1	X
Q5	I find that I could not cope with all the work that I had to do during my internship.	5	4	3	2	1	X
Q6	I am able to control irritations in my work and life.	5	4	3	2	1	X
Q7	I feel that I am on top of things at work.	5	4	3	2	1	X
Q8	I am angered because of things that were outside of my control.	5	4	3	2	1	X
Q9	I feel that difficulties at work are piling up so high that I could not overcome them.	5	4	3	2	1	X
Q10	I have little interest or pleasure in doing things that I used to enjoy.	5	4	3	2	1	X
Q11	I feel down, depressed, or hopeless because of my internship work.	5	4	3	2	1	X
Q12	I have sleeping problems, either have trouble falling or staying asleep, or sleeping too much.	5	4	3	2	1	X
Q13	I feel tired or having little energy during my internship.	5	4	3	2	1	X
Q14	I have eating problems, either have poor appetite, or have been overeating.	5	4	3	2	1	X

	During your internship year, how often do you experience these feelings or thoughts?	5 = Very Often	4 = Often	3 = Someti mes	2 = Rarely	1 = Never	Don't know/ Prefer not to say
Q15	I have trouble concentrating on things either work-related, or outside of my work.	5	4	3	2	1	X
Q16	I have the thoughts that I would be better off dead or of hurting myself in some way	5	4	3	2	1	X
Q17	I get satisfaction from being able to help people.	5	4	3	2	1	X
Q18	I feel invigorated after work during my internship.	5	4	3	2	1	X
Q19	I like my work as a medical intern.	5	4	3	2	1	X
Q20	I am pleased with how I am able to keep up with clinical techniques and protocols.	5	4	3	2	1	X
Q21	My internship work makes me feel satisfied.	5	4	3	2	1	X
Q22	I believe I can make a difference through my work.	5	4	3	2	1	X
Q23	I am proud of what I can do to help as a medical intern.	5	4	3	2	1	X
Q24	I believe that I am a success as a medical intern.	5	4	3	2	1	X
Q25	I am happy that I chose to do this work.	5	4	3	2	1	X
Q26	My internship experience met my expectation	5	4	3	2	1	X
Q27	I am not as productive at work because I am losing sleep over work-related traumatic experiences.	5	4	3	2	1	X
Q28	I feel trapped by my job as a medical intern.	5	4	3	2	1	X
Q29	I feel worn out because of my work as a medical intern.	5	4	3	2	1	X
Q30	I feel overwhelmed because my case workload seems endless during the internship.	5	4	3	2	1	X
Q31	I feel bogged down by the internship hospital.	5	4	3	2	1	X
Q32	I am preoccupied with more than one patient I am approaching and helping during my internship.	5	4	3	2	1	X

Q33	I find it difficult to separate my personal life from my life as a medical intern.	5	4	3	2	1	X
Q34	I have been affected by the hardship and stress experienced by those patients I help.	5	4	3	2	1	X
Q35	I have felt on edge about various things because of my work helping patients.	5	4	3	2	1	X
Q36	I avoid certain activities or situations because they remind me of frightening experiences of the patients I help.	5	4	3	2	1	X
Q37	As a result of my helping, I have intrusive, frightening thoughts.	5	4	3	2	1	X

This section asks your perception of the internship training centre(s) you are currently affiliated with or previously affiliated with. It also asks your perception of the clinical supervisors, i.e. those who provided teaching and supervision for you during the internship period. Please circle to what extent do you agree with these statements.

	To what extent do you agree with the following statements?	5 = Strongly agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly disagree	Don't know/ Prefer not to say
Q38	My clinical supervisors have set clear expectations	5	4	3	2	1	X
Q39	I have good clinical supervision at all times during my internship.	5	4	3	2	1	X
Q40	I have allocated time for training and education during my internship.	5	4	3	2	1	X
Q41	My clinical supervisors have good communication skills	5	4	3	2	1	X
Q42	I am able to participate actively in educational sessions during my internship	5	4	3	2	1	X
Q43	My clinical supervisors are enthusiastic about teaching and supervision	5	4	3	2	1	X
Q44	There is access to an educational programme relevant to my needs during my internship	5	4	3	2	1	X
Q45	The clinical supervisors provide me with regular feedback	5	4	3	2	1	X
Q46	I have enough clinical learning opportunities for my needs during the internship period	5	4	3	2	1	X

	To what extent do you agree with the following statements?	5 = Strongly agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly disagree	Don't know/ Prefer not to say
Q47	My clinical supervisors are accessible for teaching and supervision.	5	4	3	2	1	X
Q48	My clinical supervisors encourage me to be an independent learner	5	4	3	2	1	X
Q49	The clinical supervisors provide me with feedback on my strengths and weaknesses	5	4	3	2	1	X
Q50	My clinical supervisors have good mentoring skills	5	4	3	2	1	X
Q51	I have opportunities to acquire the appropriate practical procedures for clinical practice during my internship	5	4	3	2	1	X
Q52	My internship training makes me feel ready to be an independent medical practitioner	5	4	3	2	1	X
Q53	My clinical supervisors promote an atmosphere of mutual respect	5	4	3	2	1	X
Q54	I am pre-occupied with administrative work that impeded my ability to learn	5	4	3	2	1	X
Q55	I had an informative internship induction programme	5	4	3	2	1	X
Q56	There is an informative and comprehensive internship guideline, log book or clinical diary	5	4	3	2	1	X
Q57	I have the appropriate level of responsibility as a medical intern	5	4	3	2	1	X
Q58	I feel part of a team working here	5	4	3	2	1	X
Q59	There are clear clinical protocols in the internship hospitals	5	4	3	2	1	X
Q60	I have the opportunity to provide continuity of care during my internship	5	4	3	2	1	X
Q61	I have good collaboration with other medical practitioners, interns and clinical staff	5	4	3	2	1	X
Q62	I have suitable access to careers advice services or advisors during my internship	5	4	3	2	1	X

	To what extent do you agree with the following statements?	5 = Strongly agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly disagree	Don't know/ Prefer not to say
Q63	There are good counselling opportunities for medical interns who fail to complete their training satisfactorily	5	4	3	2	1	X
Q64	I have a contract of employment or other document that provides information about hours of work during my internship	5	4	3	2	1	X
Q65	My work hours are appropriate during my internship	5	4	3	2	1	X
Q66	My workload is fine during my internship	5	4	3	2	1	X
Q67	I am beeped or called concerning the patients inappropriately during my internship	5	4	3	2	1	X
Q68	I have to perform inappropriate tasks during my internship	5	4	3	2	1	X
Q69	There is gender discrimination in my internship hospitals	5	4	3	2	1	X
Q70	There are other forms of discrimination (e.g. ethnicity, religion, tribe, disability) in my internship hospital	5	4	3	2	1	X
Q71	There is a no-blame culture in my internship hospital	5	4	3	2	1	X
Q72	I would feel safe being treated as a patient in my internship hospital	5	4	3	2	1	X
Q73	Medical errors are handled appropriately in my internship hospital	5	4	3	2	1	X
Q74	I know the proper channels to direct questions regarding patient safety	5	4	3	2	1	X
Q75	It is difficult to discuss errors in my internship hospital	5	4	3	2	1	X
Q76	I am encouraged by my colleagues to report any patient safety concerns I may have	5	4	3	2	1	X
Q77	The culture in my internship hospital makes it easy to learn from the errors of others	5	4	3	2	1	X
Q78	I know the proper channels to direct questions regarding my own safety	5	4	3	2	1	X

Q79	I feel emotionally vulnerable within my internship hospital environment	5	4	3	2	1	X
Q80	I feel physically safe within my internship hospital environment	5	4	3	2	1	X
Q81	I get bullied or victimised within my internship hospital environment	5	4	3	2	1	X
Q82	There are clear and updated patient safety protocols in the internship hospital.	5	4	3	2	1	X
Q83	There are adequate infection prevention and control measures	5	4	3	2	1	X
Q84	I can report any concern and receive responsive feedback in my internship hospital.	5	4	3	2	1	X
Q85	The internship hospital has good quality accommodation for me when on call	5	4	3	2	1	X
Q86	There are adequate catering services provided by the internship hospital when I am on call	5	4	3	2	1	X
Q87	The internship hospital has good internet connection for my study and work need	5	4	3	2	1	X
Q88	The internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need	5	4	3	2	1	X

The questions in this section will ask you about your personal information, medical training and your personal belief. Please enter or circle your answer.

#	Question	Enter or circle your answer
D1	What is your gender?	1 = Male 2 = Female 3 = Others/prefer not to disclose
D2	What is your birth year?	(yyyy)
D3	What is your marital status? <i>(Circle one category)</i>	1=Single 2=Married 3=Divorced 4=Widowed 5=Separated
D4	Do you have children?	1=Yes 2=No
D5	How was your medical training funded? <i>(Circle one category)</i>	1=Completely self-funded 2= Received full or partial government scholarship (including but not limited to national government, county government, CDF funding) 3= Others _____

#	Question	Enter or circle your answer
D6	When you complete/completed your internship, what is/was your most preferred immediate role for employment? (Circle one category)	1=Public sector national/county hospitals (as medical officer) 2=Faith-based not-for-profit clinical service organizations (as medical officer) 3=Private-for-profit hospitals or clinics (as medical officer) 4=Public sector role in the Ministry of Health/County Health Department or parastatal organizations 5=Not-for profit technical assistance organizations (public health/health management/health program) 6=Research organization or research training 7=Specialist medical training (MMed) 8=Others _____
D7	When you complete/completed your internship, what is/was your most preferred immediate location for employment? (Circle one category)	1=Within your current internship county 2=Elsewhere in Kenya 3=Elsewhere in Africa 4=Outside of Africa
D8	Five years after your internship , what is your most preferred role for employment? (Circle one category)	1=Public sector national/county hospitals (as medical specialist/officer) 2=Faith-based not-for-profit clinical service organizations (as medical specialist/officer) 3=Private-for-profit hospitals or clinics (as medical specialist/officer) 4=Public sector role in the Ministry of Health/County Health Department or parastatal organizations 5=Not-for profit technical assistance organizations (public health/health management/health program) 6=Research organization or research training 7=Specialist medical training (MMed or others) 8=Others _____
D9	Five years after your internship , what is your most preferred sector for employment? (Circle one category)	1=Public sector 2=Private sector 3=Faith-based not for profit sector 4=Others _____
D10	Five years after your internship , what is your most preferred role for employment? (Circle one category)	1=General medical officer 2=Specialist clinician 3=Health management, health policy 4=Researcher 5=Entrepreneur 6=Others _____
D11	Five years after your internship , what is your most preferred location for employment? (Circle one category)	1=Within your current internship county 2=Elsewhere in Kenya 3=Elsewhere in Africa 4=Outside of Africa
D12	Five years after your internship , what is your	1=I don't want to work as a specialist 2=Internal medicine

	preferred specialist training? (Circle one category)	3=Surgery 4=OB/GYN 5=Paediatrics 6=Public health 7=Others_____					
#	To what extent do you agree with the following statements?	5 = Strongly agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly disagree	Don't know/ Prefer not to say
M1	I admire people who initiate or are involved in activities to aid my community	5	4	3	2	1	X
M2	It is important to contribute to activities that tackle social problems	5	4	3	2	1	X
M3	Meaningful public service is very important to me	5	4	3	2	1	X
M4	It is important for me to contribute to the common good	5	4	3	2	1	X
M5	I think equal opportunities for citizens are very important	5	4	3	2	1	X
M6	It is important that citizens can rely on the continuous provision of public services	5	4	3	2	1	X
M7	It is fundamental that the interests of future generations are taken into account when developing public policies	5	4	3	2	1	X
M8	To act ethically is essential for public servants	5	4	3	2	1	X
M9	I feel sympathetic to the plight of the underprivileged	5	4	3	2	1	X
M10	I empathize with other people who face difficulties	5	4	3	2	1	X
M11	I get very upset when I see other people being treated unfairly	5	4	3	2	1	X
M12	Considering the welfare of others is very important	5	4	3	2	1	X
M13	I am prepared to make sacrifices for the good of society	5	4	3	2	1	X
M14	I believe in putting civic duty before self	5	4	3	2	1	X
M15	I am willing to risk personal loss to help society	5	4	3	2	1	X
M16	I would agree to a good plan to make a better life for the poor, even if it costs me money	5	4	3	2	1	X

Thank you for filling out the survey.

We understand some questions may cause you to think about your work experience that is distressing and may cause emotional discomfort. You can visit the following link for resources for improving your wellbeing <https://thriveglobal.com/categories/first-responders-first/resilience-on-the-front-lines/> or access the tele-counselling services and psychological care via hotline numbers 1199 and 719 provided by the Ministry of Health and partners.

Appendix 5. Semi-structured interview guide for medical officers and consultants interview

Questions (and probes) for medical officers:

1. Please tell us about yourself (refer to the spreadsheet)
 - a. What's your current position? What type of occupation is it?
 - b. Where did you complete your internship? Was it a public, private or mission hospital? Level 4, 5 or 6?
 - c. Where did you undertake your undergraduate studies? Was it public or private?
2. How would you describe your internship experience?
 - a. What are some of the things you have enjoyed most about your internship? Things least enjoyed? Can you give examples?
 - b. Have you come across the term burnout, what does it mean to you? (state of emotional, physical and mental exhaustion caused by excessive and prolonged stress)
 - c. How would you describe the level of support you received during internship? From whom?
 - d. How do you think of patient safety in your internship hospital?
 - e. How would you describe the level of preparation you got in medical school compared to the tasks you were given in your internship?
 - f. How is it different from your intern friends who work in different hospitals?
 - g. Did Covid-19 impact your internship? health worker strike? government decentralization?
 - h. What do you think can be done to improve your internship training and experience?
3. Can you tell me how did you choose to work in this current hospital/institution? What are the factors that influenced your decision to work here?
 - a. Is this hospital/institution your first choice? Did you also apply to other jobs? Is it hard to find a job? How long did it take?
 - b. Do you think there is a difference in terms of reputation of public/private/faith-based hospitals? How does that influence your decision?
 - c. Did your preference for future career change during medical school and internship?
4. How did your internship experience influence your career decision?
 - a. Do you prefer to work in certain hospitals or institutions because of your internship?
 - b. How did your interaction with consultants/supervisors during the internship influenced your future plan?
 - c. Did your previous relationship with your other colleagues during the internship hospital influenced your career decision?
 - d. Are there any other social or political factors that influenced your career decision?
5. How safe do you feel about your current work environment, for you and for your patients?
 - a. Your personal workload (any challenges accomplishing this?)
 - b. In terms of the culture of safety in the workplace, and protocols if any (protective gear, waste disposal, essential work supplies and sundries, any changes with Covid-19)
 - c. Adequacy of communication between colleagues for the care of patients (especially from senior to juniors, across professional boundaries e.g doctors to nurses)
 - d. Teamwork (collaboration, cooperation, rather than competition)
 - e. Participation in leadership decisions
 - f. How and what would you like to see changed regarding safety at your workplace?

Questions (and probes) for consultants:

1. Please tell us about yourself
 - a. What's your current position? What specialty are you in?
 - b. What hospital are you in? Is it a public, private or mission hospital? Is it a level 4, 5 or 6?
 - c. How long have you worked here?
 - d. How many interns have you supervised? How many are you supervising now?
2. What do you think of the quality of the incoming interns? How well do you feel medical schools prepare interns for the job they have undertaken as an intern?
 - a. What could be done to better prep students for internship?
 - b. From your experience have you noticed any variations/differences in how well interns are prepared for their internship (i.e. Public/private universities or locally trained/those who trained abroad?)
 - c. What should med schools do to better prepare students for their internship?
3. Do you think the interns are competent as a general medical officer after this one-year internship training?
 - a. As a consultant/supervisor do you ensure interns have accomplished this?
 - b. Do they have adequate opportunities to practice during the internship?
 - c. How do you usually supervise and teach the interns?
 - d. Do you receive any support from the hospital as a supervisor?
4. What do you hear about the experience of medical interns more generally?
 - a. Some interns report high level of burnout and inadequate support received. Do you think that's common? Can you give some example?
 - b. How do you think the work conditions in this centre influence the learning experience of interns?
 - c. What systems/structures are there to support interns during their internship? What types of support do you think should be provided to medical officer interns?
 - d. Did Covid-19 impact their internship? health worker strike? government decentralization?
 - e. How was internship during your time? what is different now?
 - f. What recommendations can you give to better prepare interns for their internship tasks?
5. How do you think interns decide on their future career after their internship? Why do you think interns choose to work in public/private/faith-based hospitals after they are registered and licensed?
 - a. Why many interns opt for private practice?
 - b. What do you think of the reputation of these hospitals?
 - c. Is it hard for interns to find a job now? How long does it take to find a job?
 - d. Are you involved in recruiting for this hospital? How does recruitment happen?
6. Can you broadly comment about safety at your current work environment, for you, your workers and for your patients?
 - a. Your personal workload (any challenges accomplishing this?)
 - b. In terms of the culture of safety in the workplace, and protocols if any (protective gear, waste disposal, essential work supplies and sundries, any changes with Covid-19)
 - c. Adequacy of communication between colleagues for the care of patients (especially from senior to juniors, across professional boundaries e.g doctors to nurses)
 - d. Teamwork (collaboration, cooperation, rather than competition)

- e. Participation in leadership decisions
- f. How and what would you like to see changed regarding safety at your workplace?

Appendix 6. Semi-structured interview guide for county-level managers

No.	Question	Probes	Comments
1	Please tell us about yourself	Your position/role in the health sector How long you have been in that position/role Your role position prior to the current position/role Involvement in HRH management If involved in HRH management, please describe your HRH management responsibilities	e.g., meetings and decision making.
2	With respect to HRH management, please describe the structural organization/decision making structure of your country/county/sub-county/hospital/facility	Who is responsible for what? How did this decision making structure come about? Have there been recent changes in the structural organization/decision-making structure of human resource management? How does the current structural organization/decision making structure for HRH management compare with pre-devolution	health facilities in charges e.g., devolution of health functions, policy directives or ad hoc (orders from above) What brought this change? The pros and cons of the current structural organization/decision making structure
3.	Stakeholder involvement in HRH decision making	Besides the designated HRH managers, which other stakeholders influence how decisions are made over the HRH? Which aspects of HRH management do the stakeholders influence/have an interest in? How does the stakeholder influence on decision making affect HRH and HRH management? Are health workers involved in decision making that affects them? If yes, how?	e.g., board members, MCAs, local community, e.g., promotions, recruitment, postings e.g., less work output from locals compared to non-locals; insubordination by 'untouchables'

		What can be done to have a more effective stakeholder engagement?	
4	HRH management capacity	How different levels of managers/decision makers are appointed How new managers are prepared for the new role How managers are kept up to date with management knowledge/skills What are the current capacity gaps limiting the manager's ability to effectively undertake their human resource management roles? What short-term and long-term interventions need to be taken to strengthen human resource management capacity?	e.g., Presidential declaration, appointment by Governors, formal recruitment process, secondment etc e.g., simple handing over and assumed to be up to the task, induction/orientation e.g., donor-driven management workshops, government-driven management trainings, own initiative, learning on the job e.g., higher levels overriding decisions made at lower level, inadequate resources, inadequate knowledge on management processes, inadequate involvement in management meetings/functions
5	Examples of recent HRH interventions in the study county	Please give examples of HRH-specific interventions that your county has implemented in the last five years Are there specific HRH interventions that have been put in place in response to Covid-19 pandemic Why has the county prioritised the HRH interventions you have provided above	e.g., Cuban Doctors' Project, releasing HRH to go on study leave e.g., PPEs, Covid-19 allowances, additional HRH recruitments e.g., political push to implement Governor's manifesto, policy directive from MoH, HRH advocating for their rights

		How were the HRH interventions mentioned above actualised in your county What are the positive and negative outcomes from the HRH interventions mentioned above?	
6	HRH recruitment/engagement	What is the recruitment process for MOs in your county? How does it compare to other cadres What challenges do you encounter in HRH recruitment process? – how it compares for MO's versus other cadres How does the county prioritize recruiting new medical officers vs. clinical officers and nurses? How does the county attract HRH in your county? How it compares for MO's versus other cadres What health systems strengthening interventions can be done to strengthen HRH recruitment process?	-example of MO finishing internship -regularity of recruitment e.g., Are you able to hire if when you need more HRH? e.g. What's the role of a MO that could not be fulfilled by CO? e.g., extra allowances for specialised cadres, giving longer term contracts, why they won't opt for private or mission hospitals? e.g., contract terms because of fiscal unsustainability, recent policy directive to recruit on contract terms
7	HRH deployment	How HRH deployment plays out in practice Why does the county deploy this way? What are the existing HRH management challenges around HRH deployment? What short-term and long-term interventions can help improve HRH deployment?	e.g., posting to a facility, designation to an administrative role e.g., policies, memos, agreements with unions Political interference in HRH postings and appointment to administrative roles
8	HRH retention	Does the county/facility experience HRH retention challenges?	e.g., staff in rural facilities quitting jobs or seeking transfers from rural facilities

		Why does your county have HRH retention challenges? How does HRH retention for Medical Officers compare with that of other HRH cadres? What short-term and long-term interventions can help address HRH retention issues?	
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Appendix 7. KHFA indicators included for each general domain and speciality domain to understand internship hospital capacity

Domain	Indicator	1 – considered available	0 – considered unavailable
Human resources for health (6)	At least five medical specialists	- 5 or more specialists	- Less than 5 specialists
	At least one surgeon	- 1 or more	- Less than 1
	At least one internist	- 1 or more	- Less than 1
	At least one paediatrician	- 1 or more	- Less than 1
	At least one obstetrician-gynaecologist	- 1 or more	- Less than 1
	At least one anaesthesiologist	- 1 or more	- Less than 1
Lab test (31)	HIV rapid test	- Observed, at least one not expired	- Not observed, reported available but not seen - Not observed, never available
	Syphilis rapid test	- Observed, at least one not expired	- Not observed, reported available but not seen - Not observed, never available
	Urine rapid test for pregnancy	- Observed, at least one not expired	- Not observed, reported available but not seen - Not observed, never available
	Urine dipstick 3	- Observed, at least one not expired	- Not observed, reported available but not seen - Not observed, never available
	Haemoglobin A1c rapid test	- Observed, at least one not expired	- Not observed, reported available but not seen - Not observed, never available
	Colorimeter or haemoglobinometer	- Observed, functional/valid	- Reported (not seen), functional/valid - Not available today
	Glucometer	- Observed, functional/valid	- Reported (not seen), functional/valid - Not available today
	Glucometer test strips/discs	- Observed, functional/valid	- Reported (not seen), functional/valid - Not available today
	Any blood chemistry test	- Yes, onsite	- No, never available
	Renal function test	- Yes, observed, functional/valid	- No, not available today
	Other tests for bilirubin	- Yes, onsite	- Yes, offsite (specimen sent)

		- No, never available
ABO blood grouping testing	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Rhesus blood grouping testing	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Cross-match testing	- Yes, onsite	- Yes, offsite (specimen sent) - No, not available today
Onsite PCR for HIV viral load or HIV early-infant diagnosis	- Yes, onsite	- Yes, offsite (specimen sent) - Yes, not functional/not valid - No, not available today
Xpert MTB/RIF rapid diagnostic testing for TB	- Yes, onsite	- Yes, offsite (specimen sent) - No, not available today
Urine microscopy	- Yes, observed, functional/valid	- No, not available today
Malaria smears	- Yes, observed, functional/valid	- No, not available today
Microscopy test CSF body fluid counts	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Cryptococcal antigen testing	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Gram stain testing	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Culture and sensitivity test	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Blood cultures test	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Fine needle aspiration cytology	- Perform in facility	- Refer for test - Not used
Core needle biopsy of lump specimen	- Perform in facility	- Refer for test - Not used
Prostate Specific Antigen (PSA) Testing	- Perform in facility	- Refer for test - Not used
Blood gas measurement	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available
Cardiac marker (CK, Troponin) test	- Yes, onsite	- Yes, offsite (specimen sent) - No, never available

	PAP smear read in facility	- Yes, read in facility	- Yes, read outside facility - No - 0 PAP smears were conducted with results recorded during the past 12 completed months
	VIA/VILLI read in facility	- Yes, read in facility	- Yes, read outside facility - No - 0 VIA/VILLI were conducted with results recorded during the past 12 completed months
	Prepare and examine tissues or samples for cancer	- Yes	- No
Oxygen and respiratory support (10)	Surgery oxygen equipment functioning - Oxygen tank/cylinder with attached pressure gauge, pressure regulator	- Yes	- No - Don't know
	Maternity paediatric-sized oxygen delivery apparatus functioning	- Yes	- No
	Outpatient pulse oximeter functioning	- Yes	- No
	Maternity pulse oximeter functioning	- Yes	- No
	Paediatrics/neonatal oxygen functioning	- Yes	- No
	Emergency pulse oximeter functioning	- Yes	- No
	Ventilator available	- Yes, available now	- No
	Chest tubes available	- Observed, at least one not expired	- Not observed, not available today - Not observed, never available
	Adult CPAP equipment available	- Observed, at least one not expired	- Observed, available but expired - Not observed, reported available but not seen - Not observed, not available today - Not observed, never available
	Emergency paediatrics and neonatal CPAP available	- Observed	- Reported, not seen - Not available
	ECG offered	- Yes	- No

General equipment (8)	ECG equipment functioning	- Yes equipment available and functioning	- No equipment not available or not functioning
	Ultrasound offered	- Yes	- No
	Ultrasound equipment functioning	- Yes equipment available and functioning	- No equipment not available or not functioning
	X-ray offered	- Yes	- No
	X-ray equipment functioning	- Yes equipment available and functioning	- No equipment not available or not functioning
	CT scan offered	- Yes	- No
	CT scan equipment functioning	- Yes equipment available and functioning	- No equipment not available or not functioning
24 7 (8)	Emergency service with structured triage tool 24/7	- 24-hour emergency service	- 10 hours - No structured triage tool
	Medical officer onsite or oncall in facility 24/7	- MO or Emergency practitioner always available, onsite - MO or Emergency practitioner always available, not onsite but oncall in facility	- MO or Emergency practitioner always available, not in facility - Staff not available 24 hours
	Formal triage tool used 24/7	- Yes	- No
	Emergency surgery and anaesthesia 24/7	- 24-hour emergency service	- 0, 2 or 8 hours
	Emergency radiology 24/7	- 24-hour emergency service	- 0, 5, 9, 10, 12 hours
	Emergency diagnostics 24/7	- 24-hour emergency service	- 0, 7, 10, 12 hours
	Emergency pharmacy 24/7	- 24-hour emergency service	- 8, 9, 10, 12, 15 hours - No dedicated pharmacy in facility
	Blood transfusion	- Yes available now	- No
IPC (9)	Facility has IPC guideline	- Yes, observed	- Reported not seen - No
	Technical IPC committee	- Yes	- No
	Dedicated (full-time) IPC staff	- Yes	- No
	Guidelines for cleaning	- Yes, observed	- Reported not seen - No
	Step-by-step techniques for specific tasks	- Yes	- No
	Cleaning roster or schedule specifying responsibility	- Yes	- No
	Cleaning beds observed	- Yes	- No
	Cleaning counters/tables observed	- Yes	- No
	Cleaning toilets observed	- Yes	- No

Quality and safety (24)	Monthly quality assurance committee meeting	- Monthly	- Quarterly - Biannually
	Documentation of quality assurance information reviewed	- Yes, documentation observed	- Yes, documentation reported not seen
	Ongoing quality improvement using Plan-Do-Check-Study-Act approach	- Yes, service-specific - Yes, across facility	- No
	Multi-disciplinary quality improvement team	- Yes	- No
	Departmental specific work improvement teams	- Yes	- No
	Documentation of improvement achieved as a result of quality improvement process	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Kenya Quality Model for Health completed in 2017 or 2018	- 2017 - 2018	- 2014 - 2016 - Don't know
	Formal case reviews carried out at least monthly	- At least weekly - At least monthly	- At least quarterly - No specific timing
	Death reviews results recorded	- Yes	- No
	Guidelines of events that are considered adverse and required to be reported	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Notes or reports that show evidence of review and plan of action for the reports about adverse events	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Written guidelines that define nosocomial infections and the process for reporting	- Yes, observed	- Reported not seen - No
	Report or record shows nosocomial infections reported over the past 6 months	- Yes, observed	- Reported not seen - No
	Written policies and procedures for identifying and managing drug-use problems	- Yes, observed	- Reported not seen - No
	Surgery related mortality and morbidity review meetings at least monthly	- At least weekly - At least monthly	- At least quarterly - No specific timing - None conducted
	Surgery related mortality and morbidity review meeting results recorded	- Yes, observed	- Reported not seen - No

	Written guidelines or instructions for reporting on adverse events related to surgery	- Yes, observed	- Reported not seen - No - Don't know
	Notes or reports that show evidence of review and plan of action for the surgery reports	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Guidelines of postoperative infection definition	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Notes or reports that show evidence of review and plan of action for the reports about postoperative infection	- Yes, documentation observed	- Yes, documentation reported not seen - No
	Indicator on deaths prior to discharge among patients who had a procedure in a surgical theater monitored	- Yes	- No
	Indicator on deaths prior to discharge among < 15 year old patients who had a procedure in a surgical theater monitored	- Yes	- No
	Indicator on post-operative surgical wound infection numbers monitored	- Yes	- No
	Facility monitor unplanned and unexpected hospital readmissions for any conditions	- Yes	- No
Surgery equipment and medication (8)	Basic operating table functioning	- Yes	- No
	Overhead operating light functioning	- Yes	- No
	Cardiac monitor functioning	- Yes	- No - Don't know
	EKG electrodes functioning	- Yes	- No - Don't know
	Thermometer functioning	- Yes	- No - Don't know
	Blood pressure apparatus functioning	- Yes	- No
	Suction apparatus functioning	- Yes	- No
	Anaesthesia machine available	- Yes available now	- No
Surgery service (12)	Wound debridement service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No

	Acute burn management service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Closed repair of fracture service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Closed reduction of dislocated joint service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Cricothyroidotomy service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Male circumcision service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Hydrocele reduction service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Biopsy of lymph node or mass service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Appendectomy service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Hernia repair service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Open reduction and fixation service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
	Any procedures using laparotomy service available	- Yes, outpatient - Yes, inpatient - Yes both out and inpatient	- No
Internal medicine equipment and medication (3)	Defibrillator available	- Yes, available now	- No
	Renal dialysis/haemodialysis machine available	- Yes, available now	- Yes, not available now - No
	Lumbar puncture kit available	- Observed, at least one not expired	- Observed, available but expired - Not observed, reported available but not seen - Not observed, not available today - Not observed, never available
Internal medicine service (10)	ART prescription and follow-up for U5 children service available	- Yes, ART prescription and clinical follow-up	- Yes, ART prescription, no clinical follow-up - Yes, clinical follow-up, no ART prescription
	HIV/AIDS care and support service available	- Yes	- No

	Diagnose and/or manage diabetes available	- Yes	- No
	Diagnose and/or manage acute myocardial infraction available	- Diagnose, treat and patient follow-up	- Patient follow-up only - No service/refer suspect case
	Diagnose and/or manage chronic respiratory disease available	- Yes	- No
	Diagnose and/or manage chronic kidney disease available	- Yes	- No
	Screening, diagnosis and/or treatment services for breast cancer available	- Yes	- No
	Screening, diagnosis and/or treatment services for colorectal cancer available	- Yes	- No
	Screening, diagnosis and/or treatment services for prostate cancer available	- Yes	- No
	Palliative care service available	- Yes	- No
Paediatrics equipment and medication (8)	Phototherapy machine available	- Yes, available now	- No
	Infant incubator available at outpatient	- Yes, available now	- Yes, not available now - No
	Bed or location for KMC caregiver overnight	- Yes, observed	- Reported, not seen - No
	Exchange transfusion blood available today	- Yes	- No
	Incubator available today	- Yes	- No
	Radiant warmer available today	- Yes	- No
	Artificial ventilation available today	- Yes	- No
	Device for intraosseous access available	- Observed, at least one not expired	- Observed, available but expired - Not observed, reported available but not seen - Not observed, not available today - Not observed, never available
Paediatrics service (3)	KMC for premature or LBW used	- Yes	- No
	Newborn sepsis service available	- Yes	- No
	Newborn sepsis full antibiotics regimen and follow-up always available	- Yes always	- Yes sometimes - Never

OBGYN equipment and medication (10)	Blood pressure apparatus functioning	- Yes	- No
	Infant scale (with 100 gram gradation) functioning	- Yes	- Don't know
	Resuscitation table (with heat source) functioning	- Yes	- No
	Self-inflating bag and mask for resuscitation functioning	- Yes	- No
	Newborn bag and mask size 0 for resuscitation of pre-term babies functioning	- Yes	- No
	Newborn bag and mask size 1 for resuscitation of term babies functioning	- Yes	- No
	Magnesium sulphate injection available	- Observed, at least one not expired	- Not observed, not available today
	Dexamethasone injection available	- Observed, at least one not expired	- Not observed, not available today - Not observed, never available
	Misoprostol tablet 200 mcg available	- Observed, at least one not expired	- Not observed, not available today - Not observed, never available
	Oxytocin injection available	- Observed, at least one not expired	- Not observed, not available today - Not observed, never available
OBGYN service (10)	Active management of third stage labour (AMTSL) service available	- Yes	- No
	Monitoring and management of labour using a partograph service available	- Yes	- No
	Hygienic cord care service available	- Yes	- No
	Parenteral administration of antibiotics carried out	- Yes	- No
	Parenteral administration of oxytocic for treatment of postpartum haemorrhage carried out	- Yes	- No
	Assisted vaginal delivery using manual vacuum extraction (MVE) or forceps carried out	- Yes	- No, service not offered - No, trained staff but no cases
	Manual removal of placenta carried out	- Yes	- No
	Removal of retained products of conception	- Yes	- No, service not offered

	using D&C or manual vacuum aspiration carried out		
	PMTCT available	- Yes	- No
	Treatment of pre-invasive cervical cancer available	- Yes	- No
Mental health / neurology (6)	Any mental/neurological services offered	- Yes, inpatient only	- Not offered
	Mental health inpatient ward available	- Yes, inpatient only	- Not offered
	Neurological health inpatient ward available	- Yes, inpatient only	- Not offered
	Depression diagnosis and follow-up available	- Diagnoses and provides patient follow-up	- Diagnoses only - Provides patient follow-up only - No
	Psychosis diagnosis and follow-up available	- Diagnoses and provides patient follow-up	- Diagnoses only - Provides patient follow-up only - No
	Epilepsy diagnosis and follow-up available	- Diagnoses and provides patient follow-up	- Diagnoses only - Provides patient follow-up only - No

Appendix 8. Comparing internship hospitals sampled in KHHFA and others

	61 KHHFA hospitals	12 other hospitals
Level		
- Level 4	44	11
- Level 5	15	1
- Level 6	2	0
Ownership		
- MOH	54	0
- Private	2	4
- FBO	5	8
Bed number		
- Mean (SD)	262.9 (213.4)	171.2 (71.0)
- Median (IQR)	200 (156, 276)	180 (106, 221)
Total delivery		
- Mean	4585.1 (2747.0)	1349.4 (945.7)
- Median (IQR)	3980.7 (2972.3, 5502.7)	1150.4 (649.7, 1683.5)
Live births		
- Mean	4466.9 (2691.9)	1321.3 (927.8)
- Median (IQR)	3814.3 (2844, 5384.3)	1138.4 (626.5, 1630)
C-section		
- Mean	1190.3 (917.6)	536.1 (270.7)
- Median (IQR)	987.3 (734.3, 1319.3)	536.6 (289, 708.5)

Appendix 9. All indicator heatmap to understand internship hospital capacity by bed number

	Level 4 small hospitals (n=23)	Level 4 large hospitals (n=23)	Level 5 & 6 hospitals (n=15)	Total (n=61)
Human resources for health				
At least five medical specialists	39%	44%	67%	48%
At least one surgeon	96%	96%	100%	97%
At least one internist	48%	57%	73%	57%
At least one paediatrician	70%	91%	100%	85%
At least one obstetrician-gynaecologist	87%	91%	100%	92%
At least one anaesthesiologist	44%	26%	93%	49%
Lab tests				
<i>Rapid test</i>				
HIV rapid test	87%	91%	87%	89%
Syphilis rapid test	96%	91%	100%	95%
Urine rapid test for pregnancy	100%	91%	100%	97%
Urine dipstick 3	35%	44%	53%	43%
Haemoglobin A1c rapid test	57%	57%	87%	64%
Colorimeter or haemoglobinometer	70%	61%	67%	66%
Glucometer	96%	96%	93%	95%
Glucometer test strips/discs	96%	100%	93%	97%
<i>Basic lab test</i>				
Any blood chemistry test	83%	78%	93%	84%
Renal function test	70%	74%	93%	77%
Other tests for bilirubin	65%	70%	67%	67%
ABO blood grouping testing	83%	74%	80%	79%
Rhesus blood grouping testing	83%	74%	87%	80%
Cross-match testing	57%	70%	80%	67%
<i>Infectious disease test</i>				
Onsite PCR for HIV viral load or HIV early-infant diagnosis	0%	4%	27%	8%
Xpert MTB/RIF rapid diagnostic testing for TB	61%	83%	87%	75%
Urine microscopy	91%	83%	93%	89%
Malaria smears	91%	83%	93%	89%
Microscopy test CSF body fluid counts	83%	78%	93%	84%
Cryptococcal antigen testing	74%	78%	80%	77%
Gram stain testing	91%	78%	93%	87%
Culture and sensitivity test	57%	74%	87%	71%
Blood cultures test	17%	22%	80%	34%
<i>Advanced lab test</i>				
Fine needle aspiration cytology	22%	44%	67%	41%
Core needle biopsy of lump specimen	35%	44%	67%	46%
Prostate Specific Antigen (PSA) Testing	48%	61%	80%	61%
Blood gas measurement	9%	13%	60%	23%
Cardiac marker (CK, Troponin) test	9%	30%	53%	28%
PAP smear read in facility	17%	13%	33%	20%
VIA/VILLI read in facility	96%	78%	73%	84%
Prepare and examine tissues or samples for cancer	0%	4%	53%	15%

Oxygen and respiratory support

Surgery oxygen equipment functioning - Oxygen tank/cylinder with attached pressure gauge, pressure regulator

Maternity paediatric-sised oxygen delivery apparatus functioning

Outpatient pulse oximeter functioning

Maternity pulse oximeter functioning

Paediatrics/neonatal oxygen functioning

Emergency pulse oximeter functioning

Ventilator available

Chest tubes available

Adult CPAP equipment available

Emergency paediatrics and neonatal CPAP available

87%	83%	73%	82%
87%	74%	93%	84%
39%	48%	60%	48%
35%	52%	67%	49%
100%	100%	100%	100%
65%	65%	100%	74%
52%	52%	87%	61%
30%	61%	80%	54%
13%	30%	40%	26%
17%	26%	20%	21%

Equipment

ECG offered

ECG equipment functioning

Ultrasound offered

Ultrasound equipment functioning

X-ray offered

X-ray equipment functioning

CT scan offered

CT scan equipment functioning

39%	35%	93%	51%
26%	35%	87%	44%
83%	91%	100%	90%
83%	91%	100%	90%
87%	87%	100%	90%
87%	83%	100%	89%
26%	22%	80%	38%
26%	17%	73%	34%

24 7 availability

Emergency service 24/7

Medical officer onsite or oncall in facility 24/7

Formal triage tool used 24/7

Emergency surgery and anaesthesia 24/7

Emergency radiology 24/7

Emergency diagnostics 24/7

Emergency pharmacy 24/7

Blood transfusion

26%	13%	47%	26%
78%	70%	93%	79%
26%	17%	47%	28%
17%	13%	40%	21%
91%	87%	100%	92%
96%	87%	93%	92%
87%	83%	93%	87%
91%	83%	100%	90%

Infection prevention and control

Facility has IPC guideline

Technical IPC committee

Dedicated (full-time) IPC staff

Guidelines for cleaning

Step-by-step techniques for specific tasks

Cleaning roster or schedule specifying responsibility

Cleaning beds observed

Cleaning counters/tables observed

Cleaning toilets observed

87%	70%	87%	80%
96%	100%	93%	97%
57%	52%	73%	59%
48%	57%	33%	48%
44%	57%	60%	53%
48%	61%	73%	59%
44%	61%	67%	56%
48%	61%	60%	56%
48%	70%	67%	61%

Quality and safety

Monthly quality assurance committee meeting

Documentation of quality assurance information reviewed

Ongoing quality improvement using Plan-Do-Check-Study-Act approach

Multi-disciplinary quality improvement team

Departmental specific work improvement teams

Documentation of improvement achieved as a result of quality improvement process

26%	35%	53%	36%
52%	44%	67%	53%
64%	67%	67%	66%
65%	61%	80%	67%
65%	61%	80%	67%
48%	52%	33%	46%

Kenya Quality Model for Health completed in 2017 or 2018

Formal case reviews carried out at least monthly

Death reviews results recorded

Guidelines of events that are considered adverse and required to be reported

Notes or reports that show evidence of review and plan of action for the reports about adverse events

Written guidelines that define nosocomial infections and the process for reporting

Report or record shows nosocomial infections reported over the past 6 months

Written policies and procedures for identifying and managing drug-use problems

Surgery related mortality and morbidity review meetings at least monthly

Surgery related mortality and morbidity review meeting results recorded

Written guidelines or instructions for reporting on adverse events related to surgery

Notes or reports that show evidence of review and plan of action for the surgery reports

Guidelines of postoperative infection definition

Notes or reports that show evidence of review and plan of action for the reports about postoperative infection

Indicator on deaths prior to discharge among patients who had a procedure in a surgical theater monitored

Indicator on deaths prior to discharge among < 15 year old patients who had a procedure in a surgical theater monitored

Indicator on post-operative surgical wound infection numbers monitored

Facility monitor unplanned and unexpected hospital readmissions for any conditions

48%	44%	60%	49%
57%	57%	67%	59%
91%	91%	100%	93%
22%	35%	33%	30%
22%	39%	27%	30%
9%	9%	40%	16%
9%	4%	33%	13%
70%	65%	67%	67%
44%	39%	60%	46%
44%	57%	53%	51%
9%	26%	33%	21%
9%	17%	27%	16%
17%	26%	33%	25%
13%	17%	13%	15%
9%	22%	53%	25%
9%	17%	47%	21%
9%	17%	40%	20%
30%	26%	40%	31%

Surgery

Surgery equipment & medication

Basic operating table functioning

Overhead operating light functioning

Cardiac monitor functioning

EKG electrodes functioning

Thermometer functioning

Blood pressure apparatus functioning

Suction apparatus functioning

Anaesthesia machine available

96%	96%	100%	97%
96%	96%	100%	97%
87%	83%	100%	89%
83%	70%	100%	82%
96%	87%	93%	92%
70%	91%	93%	84%
100%	96%	100%	98%
83%	74%	93%	82%

Surgery service

Wound debridement service available

Acute burn management service available

Closed repair of fracture service available

Closed reduction of dislocated joint service available

Cricothyroidotomy service available

Male circumcision service available

Hydrocele reduction service available

Biopsy of lymph node or mass service available

Appendectomy service available

Hernia repair service available

Open reduction and fixation service available

Any procedures using laparotomy service available

100%	100%	100%	100%
96%	96%	100%	97%
96%	91%	100%	95%
96%	91%	100%	95%
78%	57%	80%	71%
100%	96%	93%	97%
100%	91%	93%	95%
100%	100%	100%	100%
100%	96%	100%	98%
100%	96%	100%	98%
100%	83%	100%	93%
100%	96%	100%	98%

Internal medicine

Internal medicine equipment & medication

Defibrillator available

Renal dialysis/haemodialysis machine available

Lumbar puncture kit available

57%	39%	73%	54%
44%	65%	93%	64%
22%	26%	80%	38%

Internal medicine service

ART prescription and follow-up for U5 children service available

HIV/AIDS care and support service available

Diagnose and/or manage diabetes available

Diagnose and/or manage acute myocardial infraction available

Diagnose and/or manage chronic respiratory disease available

Diagnose and/or manage chronic kidney disease available

Screening, diagnosis and/or treatment services for breast cancer available

Screening, diagnosis and/or treatment services for colorectal cancer available

Screening, diagnosis and/or treatment services for prostate cancer available

Palliative care service available

96%	96%	93%	95%
100%	96%	100%	98%
100%	100%	100%	100%
83%	74%	93%	82%
100%	100%	100%	100%
83%	91%	100%	90%
78%	87%	93%	85%
35%	30%	60%	39%
61%	83%	87%	75%
48%	65%	100%	67%

Paediatrics**Paediatrics equipment & medication**

Phototherapy machine available

Infant incubator available

Bed or location for KMC caregiver overnight

Exchange transfusion blood available today

Incubator available today

Radiant warmer available today

Artificial ventilation available today

Device for intraosseous access available

52%	52%	67%	56%
74%	78%	87%	79%
61%	70%	80%	69%
26%	17%	60%	31%
96%	100%	100%	98%
91%	96%	93%	93%
48%	57%	73%	57%
17%	30%	53%	31%

Paediatrics service

KMC for premature or LBW used

Newborn sepsis service available

Newborn sepsis full antibiotics regimen and follow-up always available

83%	87%	93%	87%
100%	96%	100%	98%
91%	87%	87%	89%

OBGYN**OBGYN equipment & medication**

Blood pressure apparatus functioning

Infant scale (with 100 gram gradation) functioning

Resuscitation table (with heat source) functioning

Self-inflating bag and mask for resuscitation functioning

Newborn bag and mask size 0 for resuscitation of pre-term babies functioning

Newborn bag and mask size 1 for resuscitation of term babies functioning

Magnesium sulphate injection available

Dexamethasone injection available

Misoprostol tablet 200 mcg available

Oxytocin injection available

91%	100%	100%	97%
87%	96%	100%	93%
91%	100%	93%	95%
87%	91%	80%	87%
91%	91%	87%	90%
96%	96%	93%	95%
96%	96%	100%	97%
91%	91%	73%	87%
74%	70%	73%	72%
100%	96%	100%	98%

OBGYN service

Active management of third stage labour (AMTSL) service available

Monitoring and management of labour using a partograph service available

100%	100%	100%	100%
96%	96%	100%	97%

Hygienic cord care service available	100%	91%	93%	95%
Parenteral administration of antibiotics carried out	100%	100%	100%	100%
Parenteral administration of oxytocic for treatment of postpartum haemorrhage carried out	100%	100%	100%	100%
Assisted vaginal delivery using manual vacuum extraction (MVE) or forceps carried out	57%	74%	73%	67%
Manual removal of placenta carried out	100%	100%	100%	100%
Removal of retained products of conception using D&C or manual vacuum aspiration carried out	83%	83%	100%	87%
PMTCT available	100%	100%	100%	100%
Treatment of pre-invasive cervical cancer available	44%	48%	53%	48%
Mental health / neurology				
Any mental/neurological services offered	65%	96%	93%	84%
Mental health inpatient ward available	26%	48%	80%	48%
Neurological health inpatient ward available	13%	22%	67%	30%
Depression diagnosis and follow-up available	48%	87%	87%	72%
Psychosis diagnosis and follow-up available	52%	91%	87%	75%
Epilepsy diagnosis and follow-up available	57%	91%	87%	77%

Note: The colours in the figure reflect the relative values of capacity scores, the darkest green represents the highest values in the table, while the darkest red represents the lowest values.

Appendix 10. Example search strategy for tools examining internship experience

Database(s): Embase 1974 to present

Search Strategy:

#	Searches	Results
1	exp education, medical, graduate/	308957
2	Clinical Clerkship/	13348
3	(foundation adj2 doctor*).ti,ab.	628
4	"junior doctor*".ti,ab.	4809
5	"house officer*".ti,ab.	2222
6	(medical and trainee*).ti,ab.	13796
7	(medical and (intern or interns or internship*)).ti,ab.	5295
8	"medical resident*".ti,ab.	2274
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	323067
10	exp "Surveys and Questionnaires"/	693348
11	(questionnaire* or survey*).ti,ab.	1370946
12	(assessment* or evaluation* or scale* or index* or tool* or instrument*).ti,ab.	5394065
13	10 or 11 or 12	6300213
14	9 and 13	103586
15	(experience* or culture or supervision* or environment* or climate* or "well being" or wellbeing).ti,ab.	3347914
16	Social Environment/	32668
17	15 or 16	3364439
18	9 and 13 and 17	34217
19	18	34217
20	(cardiolog* or neurolog* or "public health*" or oncolog* or cancerolog* or "infectious disease*" or epidemiolog* or immunolog* or haematolog* or surgery* or surgeon* or surgic* or gastroenterolog* or psychiatr* or psychology* or pediatric* or paediatric* or gynecolog* or gynaecolog* or obstetric* or endocrinolog* or rheumatolog* or nutrition* or urolog* or "internal medicine*" or dent* or veterinar* or pharmac* or nurs* or radiolog* or anaesthe* or anesthe* or "emergency medicine*" or "family practice*" or "family medicine*" or "primary care*" or "general practice*" or nephrolog* or geriatric* or dermatolog* or orthopaedic* or	7881702

	orthopaedic* or osteopath* or ophthalmolog* or veterinar* or patholog* or anatomy*).ti,ab.	
21	("physician assistant*" or "paramedic*" or "nurse*" or "midwife" or "midwives" or "community health worker*").ti,ab.	346976
22	("interview*" or "focus group discussion*" or qualitative).ti,ab.	631891
23	qualitative research/ or qualitative research.mp.	83017
24	psychomotor performance/ or motor skills/	89823
25	exp Surgical Procedures, Operative/ or surgical procedures.mp.	4717327
26	("surgical" or "procedural").ti,ab.	1315863
27	20 or 21 or 22 or 23 or 24 or 25 or 26	11068379
28	27	11068379
29	19 not 28	7969

Appendix 11. Characteristics of included studies for tools for understanding internship experience

Authors	Year of publication	Country of study	Study population category	Number of year post graduation	Hospital included number	Participant sample size	Data collection approach	Questionnaire type	Full questionnaire available	Any specific tool used 1	Any specific tool used 2	Any specific tool used 3	Well-being	Educational environment	Work environment and conditions	Validity	Reliability
Hinze (1)	2004	US	Resident	NA	116	99	Telephone	Self-reported	Selected questions available						Harassment	0	0
Galam et al. (2)	2017	France	Trainee	1-2	NA	343	Online	Self-reported	Tools available, other question not available	MBI	Jefferson Physician Empathy Scale	Hospital Anxiety and Depression Scale	Burnout, stress, anxiety, depression, empathy, coping strategy			Previously validated in other studies	0
Martinez et al. (3)	2015	US	Resident	1-5	6	837	Online	Self-reported	Tools available	Safety Attitudes Questionnaire	Speaking up climates			Teamwork, professionalism	Safety	Face validity, concurrent validity, discriminate validity, construct validity (CFA)	Internal consistency (cronbach's alpha)
Kobayashi (4)	2006	US and Japan	Resident	1-2	NA	240	Paper	Self-reported	Questions available	Operating Team Resource Management Survey				Teamwork, professionalism, communication	Safety	0	0
Baldwin et al. (5)	2003	US	Resident	1-2	NA	3604	Paper	Self-reported	Selected questions available	Modified AMA survey			Stress, sleep, job satisfaction	Supervision, professionalism	Work hour, harassment	0	0
Mitchell et al. (6)	2009	US	Resident	1-3	7	424	Online and paper	Self-reported	Tools available	Cognitive Behaviour Survey - Residency				Learning environment		Construct validity	Internal consistency (cronbach's alpha)
Sen et al. (7)	2010	US	Intern	1	13	740	Online	Self-reported	Tools available	PHQ-9	Perceived Stress Scale	Sarason Social Support Questionnaire, Connor-Davidson Resilience Scale	Depression, sleep, stress	Support	Work hour	Previously validated in other studies	0
Chu et al. (8)	2009	US	Intern	NA	1	72	NA	Self-reported	Selected questions available					Handoff, supervision		0	0
Ross et al. (9)	2018	South Africa	Intern	1-2	1	41	Paper	Self-reported	Selected questions available					Supervision, teaching	Work hour, infrastructure	0	0
Brant et al. (10)	2010	UK	Preregistration house officer	1	NA	36	NA	Self-reported	Tools available	MBI	Hospital Anxiety and Depression Scale		Burnout, anxiety, depression			Previously validated in other studies	Internal consistency (cronbach's alpha)
Heard et al. (11)	2004	US	Resident	NA	NA	427	Online	Self-reported	Selected questions available					Supervision, feedback	Workload	Construct validity, content validity, discriminate validity	Internal consistency (cronbach's alpha)
Bolanowski (12)	2005	Poland and France	Intern	NA	NA	986	Paper	Self-reported	Selected questions available	Anxiety about professional future			Anxiety			Construct validity (CFA)	Internal consistency (cronbach's alpha)
Han & Maxwell (13)	2006	UK	Foundation year	NA	NA	100	Paper	Self-reported	Questions available					Preparedness		0	0
Carr et al. (14)	2013	Australia	Junior doctor	1	NA	302	NA	Supervisor rated	Tools available	Junior Doctor Assessment Tool				Communication, teamwork, professionalism		Face validity, construct validity	Internal consistency (cronbach's alpha)
Gooneratne et al. (15)	2008	Sri Lanka	Intern	NA	3	86	NA	Self-reported	Tools available	PHEEM				Educational environment, supervision, induction, communication, feedback, career development,	Work hour, harassment, safety, bullying, food and accommodation	Construct validity (EFA)	Internal consistency (cronbach's alpha)

														teamwork, teaching, support			
Loftus et al. (16)	2019	US and Japan	Resident	NA	NA	484	Online	Self-reported	Selected questions available	ACGME Resident Survey				Teamwork, educational experience, handoff	Workload, safety	0	0
Lin et al. (17)	2018	Myanmar	House officer	NA	21	159	Online	Self-reported	Tools available	MBI	Satisfaction with Life Scale	Copenhagen Psychosocial Questionnaire	Burnout, life satisfaction	Support		Previously validated in other studies	Previously tested in other studies
Hannan et al. (18)	2017	Ireland	Intern	NA	4	101	Online	Self-reported	Tools available	MBI	General Health Questionnaire (GHQ-12)		Burnout, psychological distress	Support, preparedness, teamwork	Workload	Face validity, construct validity	Previously tested in other studies
Calcides et al. (19)	2019	Brazil	Intern	NA	1	184	Paper	Self-reported	Tools available	MBI			Burnout			Previously validated in other studies	Previously tested in other studies
Li et al. (20)	2013	Germany	Resident	NA	NA	417	Paper	Self-reported	Tools available	State-Trait Depression Scale	Effort–Reward Imbalance (ERI)		Depression, stress			Previously validated in other studies	Internal consistency (cronbach's alpha)
Vinothkumar et al. (21)	2016	India	Intern	NA	NA	120	NA	Self-reported	Tools available	Perceived stress scale	Occupational stress indicator-2	Job satisfaction scale	Stress, job satisfaction			Not clear what type of validity	Internal consistency (cronbach's alpha)
Talih et al. (22)	2015	Lebanon	Resident	NA	NA	118	Online	Self-reported	Tools available	PHQ-9	Burnout measure (BM)	Generalised anxiety disorder-7 (GAD-7)	Burnout, stress, depression			Previously validated in other studies	Previously tested in other studies
Carr et al. (23)	2014	Australia	Junior doctor (PGY1)	1	NA	237	NA	Supervisor rated	Tools available	Junior Doctor Assessment Tool				Communication, professionalism, teamwork		Previously validated in other studies	Previously tested in other studies
Roff et al. (24)	2005	UK	Preregistration house officer	1	88	109	Paper	Self-reported	Tools available	PHEEM				Educational environment, supervision, induction, communication, feedback, career development, teamwork, teaching, support	Work hour, harassment, safety, bullying, food and accommodation	Face validity	Internal consistency (cronbach's alpha)
Robson et al. (25)	2011	UK	Foundation year	1-2	3	69	Online	Self-reported	Tools available						Safety	Content validity, construct validity	0
Goldacre et al. (26)	2003	UK	Preregistration house officer	1	NA	3074	Paper	Self-reported	Selected questions available				Job satisfaction	Support, handoff, induction, supervision, teaching, feedback	Workload, food and accommodation	0	0
Bleakley & Brennan (27)	2011	UK	Foundation year	1	NA	146	Online and paper	Self-reported	Questions available	Modified Manchester questionnaire				Preparedness		0	0
Linklater (28)	2010	UK	Foundation year	1	1	74	Paper	Self-reported	Questions available					Support, preparedness		0	0
Mohammadi et al. (29)	2019	Iran	Intern	1	1	17	NA	Self-reported	Tools available	Spielberger's Situational Anxiety Inventory			Anxiety			Previously validated in other studies	Previously tested in other studies
Kalmbach et al. (30)	2018	US	Intern	1	1	33	Online and telephone	Self-reported	Questions available				Sleep, mood			0	0
Mayer (31)	2017	US	Intern	1	NA	74	Online	Self-reported	Tools available	PHQ-9	Perceived stress scale		Depression, stress		Work hours	0	Internal consistency (cronbach's alpha), test-retest

Farley et al. (32)	2015	UK	Foundation year	1-2	8	158	Online	Self-reported	Selected questions available	Cyber Negative Acts Questionnaire	Positive and Negative Affect Schedule (PANAS) scales			Wellbeing		Bullying	Previously validated in other studies	Internal consistency (cronbach's alpha)
Mataya et al. (33)	2015	Malawi	Intern	1-1.5	2	61	Paper	Self-reported	Selected questions available					Job satisfaction, quality of life	Learning environment, supervision, career development	Work hours, pay and remuneration	0	0
Friesen et al. (34)	2008	US	Intern	1	NA	66	Paper	Self-reported	Tools available	Cohen Perceived Stress Scale	Chalder Fatigue Scale	Medical Outcomes Study (MOS) Sleep Scale	Stress, fatigue, sleep	Teamwork	Work hours	Previously validated in other studies	Internal consistency (cronbach's alpha)	
Auret et al. (35)	2013	Australia	Intern	1	5	74	Online	Self-reported	Tools available	PHEEM				Educational environment, supervision, induction, communication, feedback, career development, teamwork, teaching, support	Work hour, harassment, safety, bullying, food and accommodation	Previously validated in other studies	Previously tested in other studies	
Miles et al. (36)	2015	UK	Foundation year	1	13	192	Paper	Self-reported	Selected questions available					Induction		0	0	
O'Donnell et al. (37)	2012	UK	Foundation year	2	NA	147	NA	Self-reported	Tools available	State-Trait Anxiety Inventory			Anxiety			Previously validated in other studies	Test-retest	
Rogers E. et al. (38)	2016	Canada	Resident	1-5	NA	198	Online	Self-reported	Tools available	Copenhagen Burnout Inventory	Lubben Social Network Scale		Burnout, loneliness	Support		Concurrent validity	Internal consistency (cronbach's alpha)	
Bruce et al. (39)	2003	Australia	Intern	1	2	302	NA	Self-reported	Tools available	GHQ			Psychological distress, wellbeing			Previously validated in other studies	0	
McKavanagh et al. (40)	2012	UK	Foundation year	1-2	NA	215	Online	Self-reported	Questions available					Supervision, feedback		0	0	
Shapiro et al.(41)	2019	US	Trainee	NA	NA	258	NA	Self-reported	Tools available	PHQ-9			Wellbeing			Previously validated in other studies	Previously tested in other studies	
Arora et al. (42)	2013	US	Intern	1	2	31	Online	Peer rated	Selected questions available	the Handoff Clinical Evaluation Exercise				Professionalism, communication, feedback, handoff	Workload	Previously validated in other studies	Interrater reliability, internal consistency (cronbach's alpha)	
Arora et al. (43)	2010	US	Intern	1	3	299	Paper	Self-reported	Selected questions available				Fatigue	Supervision	Work hours	0	0	
Gruppen et al. (44)	2015	US	Resident	NA	20	798	Online	Self-reported	Selected questions available	Modified Resident Questionnaire				Learning environment	Workload	0	Internal consistency (cronbach's alpha)	
Rovik et al. (45)	2007	Norway	Intern	1	NA	402	Paper	Self-reported	Tools available	Cooper Job Stress			Stress		Work hours	Construct validity, face validity	Internal consistency (cronbach's alpha)	
Chandramouleeswaran et al. (46)	2014	India	Intern	1	1	93	Paper	Self-reported	Tools available	Health Consultant’s Job Stress and Satisfaction questionnaire			Stress, satisfaction			0	0	
Henning et al. (47)	2013	New Zealand	Junior doctor in their first year	1	1	17	NA	Self-reported	Tools available	Depression, Anxiety and Stress Scales	Eurohis quality of life	Copenhagen Burnout Inventory (CBI)	Depression, stress, burnout, quality of life			Previously validated in other studies	Previously tested in other studies	
Byszewski et al. (48)	2017	Canada	Resident	NA	2	187	Online	Self-reported	Tools available	Learning environment professionalism survey				Learning environment		Previously validated in other studies	Internal consistency (cronbach's	

																	alpha), test-retest
Keim et al. (49)	2006	US	Resident	1-3	1	34	Online	Self-reported	Tools available	Brief resident wellness profile	Stress profile	Positive states of mind	Wellness, satisfaction, stress		Work hour	Convergent validity, discriminant validity, concurrent validity, face validity	Internal consistency (cronbach's alpha)
Hoppe et al. (50)	2009	Sweden	Intern	1-2	NA	69	Online	Self-reported	Selected questions available					Preparedness, feedback, supervision, communication, training		Previously validated in other studies	0
Han et al. (51)	2014	South Korea	Intern	1	1	61	Paper	Self-reported	Selected questions available	Mentorship effectiveness scale	Minnesota Satisfaction Questionnaire		Job satisfaction	Supervision		Previously validated in other studies	Internal consistency (cronbach's alpha)
Bu et al. (52)	2019	UK	Foundation year	1-2	1	20	Paper	Self-reported	Selected questions available				Stress, well-being			0	0
Cave et al. (53)	2007	UK	Junior doctor in their first year	1	NA	4874 in 2005, 5330 in 2000	Paper	Self-reported	Selected questions available					Preparedness		0	0
Kazmi et al. (54)	2008	Pakistan	House officer	NA	1	55	NA	Self-reported	Not available				Stress	Communication, supervision	Workload	0	0
Hassan et al. (55)	2014	Pakistan	House officer	NA	1	269	NA	Self-reported	Tools available	Perceived stress scale			Stress			Previously validated in other studies	Previously tested in other studies
Cedfeldt et al. (56)	2010	US	Resident	1-4+	1	445	Online	Self-reported	Questions available				Stress, job satisfaction, wellbeing, sleep			Previously validated in other studies	0
Kleim et al. (57)	2014	Switzerland	Intern	NA	NA	47	Online	Self-reported	Tools available	PHQ-9	Connor-Davidson-Resilience Scale		Depression, stress			Previously validated in other studies	Internal consistency (cronbach's alpha)
Abuhusain et al. (58)	2009	Ireland	Intern	NA	NA	99	Paper	Self-reported	Not available					Preparedness, induction, learning environment		0	0
Kelly et al. (59)	2011	Australia	Intern	1	1	52	Online	Self-reported	Selected questions available					Preparedness		0	0
Goldacre et al. (60)	2003	UK	Preregistration house officer	1	NA	3446	Paper	Self-reported	Selected questions available					Preparedness		0	0
Charalambous et al. (61)	2007	Cyprus	Preregistration trainee	NA	NA	79	Paper	Self-reported	Questions available	A 60-item instrument developed by Bellini				Feedback, learning environment, supervision	Workload, infrastructure, harassment, pay and remuneration, food and accommodation	0	0
Lau et al. (62)	2017	Australia	Junor medical officer	NA	NA	1085	Online	Self-reported	Tool and selected questions available	Kessler Psychological Distress Scale				Anxiety and depression	Work hours	0	0
Lin et al. (63)	2013	Taiwan/China	Intern	1	1	74	Paper	Self-reported	Tools available	Beck depression and anxiety inventories			Anxiety, depression			Previously validated in other studies	Previously tested in other studies
Rodger et al. (64)	2002	UK	Preregistration house officer	NA	3	66	Paper	Self-reported	Tool and selected questions available	GHQ-12			Psychological distress, job satisfaction	Support, supervision	Workload	Previously validated in other studies	0
Al Sultan et al. (65)	2002	Saudi Arbia	Intern	1	NA	101	NA	Self-reported	Selected questions available	Modified questionnaire by Buckey and Harasym			Stress	Supervision, feedback, communication	Work hours, food and accommodation, harassment	0	0
Appelbaum et al. (66)	2018	US	Resident	NA	NA	322 and 496	Paper	Self-reported	Tools available	Short Survey of Perceived	Psychological Safety Scale			Support, learning environment	Safety	Concurrent validity,	Internal consistency

										Organizational Support						construct validity	(cronbach's alpha)
Newbury-Birch et al. (67)	2001	UK	Preregistration house officer	NA	18	109	NA	Self-reported	Tools available	Occupational Stress Indicator	GHQ-30	Hospital Anxiety and Depression Scale	Anxiety, depression, psychological distress, job satisfaction			0	0
Choi et al. (68)	2017	US	Resident	1-4+	1	2200	Online	Self-reported	Questions available	MBI			Burnout, stress, job satisfaction, sleep	Work hours		Previously validated in other studies	0
Reynolds et al. (69)	2019	US	Resident	NA	NA	365	Online	Self-reported	Questions available					Professionalism		0	Internal consistency (cronbach's alpha)
Holt et al. (70)	2010	US	Resident	NA	NA	91,073	Online	Self-reported	Questions available	ACGME Resident Survey				Supervision, feedback, learning environment	Work hours, safety	Predictive validity, construct validity	Internal consistency (cronbach's alpha)
Baldwin et al. (71)	2018	US	Resident	2-3	16	759	Online	Self-reported	Selected questions available					Supervision		0	0
Baldwin & Daugherty (72)	2004	US	Resident	1-2	NA	3604	Paper	Self-reported	Selected questions available				Stress, sleep	Supervision, overall learning, professionalism	Work hours, harassment	Previously validated in other studies	0
Min et al. (73)	2015	US	Resident	1	1	69	NA	Self-reported	Selected questions available	Brief Resident Wellness Profile	Pittsburgh Sleep Quality Index		Wellness, sleep disturbance			Previously validated in other studies	Previously tested in other studies
Zebrowski et al. (74)	2018	US	Resident	1	NA	281	Paper	Self-reported	Tool and selected questions available	Pittsburgh Sleep Quality Index	Epworth Sleepiness Scale		Sleep			Previously validated in other studies	Previously tested in other studies
Yusoff et al. (75)	2011	Malaysia	House officer	NA	1	42	NA	Self-reported	Tools available	GHQ-12	General stressor questionnaire	Brief COPE	Psychological distress	Teamwork, supervision, support	Workload, pay, work-family conflict	Previously validated in other studies	Internal consistency (cronbach's alpha)
Sangi-Haghpeykar et al. (76)	2009	US	Resident	1-5	1	275	Paper	Self-reported	Tools available	Quality of life inventory	Stress inventory		Quality of life, stress			Previously validated in other studies	Previously tested in other studies
Kashner et al. (77)	2010	US	Resident	1-7	NA	18323	NA	Self-reported	Questions available				Stress, fatigue	Supervision, learning environment, support, teamwork, teaching	Work hours, infrastructure, safety, food and accommodation	0	0
Touchie et al. (78)	2014	Canada	Resident	1	NA	48	Online	Self-reported	Selected questions available					Supervision		Face validity	0
Jagsi et al. (79)	2008	US	Resident	1-6+	2	1498	Paper and online	Self-reported	Questions available				Fatigue		Work hours, safety	0	0
Marek et al. (80)	2019	US	Resident	NA	1	28	NA	Self-reported	Selected questions available				Burnout, sleep			Previously validated in other studies	0
Goldacre et al. (82)	2008	UK	Preregistration house officer	1	NA	6243	Paper	Self-reported	Selected questions available					Supervision, support, preparedness	Work hours, remuneration, food and accommodation	0	0
Choi et al. (83)	2006	US	Resident	NA	NA	450	NA	Self-reported	Selected questions available				Job satisfaction		Work hours	Previously validated in other studies	0
Degen et al. (84)	2014	Germany	Resident	2-3	NA	557	Paper	Self-reported	Selected questions available	Work Analysis Instrument for Hospitals				Teaching, support	Workload	Previously validated in other studies	Internal consistency (cronbach's alpha)
Burford et al. (85)	2014	UK	Foundation year	1	NA	356	Paper	Self-reported	Selected questions available					Preparedness, overall learning		0	0
Anastasiadis et al. (86)	2018	Greece	Trainee	NA	1	104	NA	Self-reported	Tools available	Social Capital Questionnaire (SCQ-G)	Sources of Stress Scale (SSS)	PHEEM	Stress	Educational environment, supervision, induction, communication, feedback, career	Work hour, harassment, safety, bullying, food and accommodation	Previously validated in other studies	0

													development, teamwork, teaching, support		
Tyssen et al. (87)	2005	Norway	Intern	1	NA	371	Paper	Self-reported	Tool and selected questions available	Cooper's Job stress questionnaire	Climate for learning	Stress, sleep	Learning environment, support	Construct validity	Internal consistency (cronbach's alpha)
Bola et al. (88)	2015	South Africa	Intern	2	24	90	Online	Self-reported	Selected questions available				Supervision, teaching, handoff, induction	Safety, workload	Previously validated in other studies
Doran et al. (89)	2007	UK	Preregistration house officer	1	5	149	Paper	Self-reported	Questions available				Preparedness, supervision	Work load	0
Lambert et al. (90)	2013	UK	Preregistration house officer	1	NA	14329	Paper	Self-reported	Selected questions available			Job satisfaction	Teaching	Workload	0
Guille et al. (90)	2017	US	Intern	1	34	3121	Online	Self-reported	Tools available	Work and Family Conflict Scale	PHQ-9	Depression		Work-family conflict	Previously validated in other studies
Finucane & O'Dowd (91)	2005	Ireland	Intern	1	NA	300	Paper	Self-reported	Questions available				Teaching, feedback, preparedness	Accomodation, pay, harassment, workload	0
Swaid et al (92)	2017	Saudi Arabia	Intern	1	1	71	Online	Self-reported	Selected questions available			Job satisfaction	Induction, preparedness, teaching		0

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Appendix 12. Detailed information of tool and questionnaire used in 92 included studies on internship experiences

Theme 1: Well-being

Tool name	Time used	Reference	Sub-themes	Internal validity evidence	Reliability evidence
Maslach Burnout Inventory (MBI)	6	(2,10,17–19,45)	Burnout	Previously tested	Previously tested
Patient Health Questionnaire-9 (PHQ-9)	6	(7,22,31,41,57,90)	Depression	Previously tested	(31) Internal consistency (Cronbach's alpha = 0.74-0.85), test-retest
General Health Questionnaire-12 or 30 (GHQ-12 or GHQ-30)	5	(18,39,64,67,75)	Psychological distress	Previously tested	Previously tested
Perceived stress scale	4	(7,21,31,55)	Stress	Previously tested	(31) Internal consistency (Cronbach's alpha = 0.82-90), test-retest
Hospital Anxiety and Depression Scale	3	(2,10,67)	Anxiety, depression	Previously tested	(10) Internal consistency (Cronbach's alpha = 0.53)
Brief resident wellness profile	2	(49,73)	Wellness	(49) Convergent validity (r=0.63), discriminant validity (r=-0.37), concurrent validity (r=0.007), face validity	(73) Internal consistency (Cronbach's alpha = 0.83)
Connor-Davidson-Resilience Scale	2	(7,57)	Stress	0	(57) Internal consistency (Cronbach's alpha = 0.85)
Cooper Job Stress	2	(45,86)	Stress	(45) Construct validity (four factors), face validity (86) Construct validity (three factors)	(45) Internal consistency (Cronbach's alpha = 0.73-0.83) (86) Internal consistency (Cronbach's alpha = 0.90)
Copenhagen Burnout Inventory	2	(38,47)	Burnout	Previously tested	(38) Internal consistency (Cronbach's alpha = 0.73-0.71 and 0.82)
Occupational Stress Indicator	2	(21,67)	Stress	0	(21) Internal consistency (Cronbach's alpha = 0.89)
Pittsburgh Sleep Quality Index	2	(73,74)	Sleep	Previously tested	Previously tested
UK Medical Career Research Group	2	(26,89)	Job satisfaction	0	0
Anxiety about professional future	1	(12)	Anxiety	(12) Construct validity (one factor)	(12) Internal consistency (Cronbach's alpha = 0.71)

Chalder Fatigue Scale	1	(34)	Fatigue	Previously tested	(34) Internal consistency (Cronbach's alpha = 0.95)
Cohen Perceived Stress Scale	1	(34)	Stress	Previously tested	(34) Internal consistency (Cronbach's alpha = 0.68)
Effort–Reward Imbalance (ERI)	1	(20)	Stress	Previously tested	(20) Internal consistency (Cronbach's alpha = 0.70-82)
General stressor questionnaire	1	(75)	Stress	Previously tested	(75) Internal consistency (Cronbach's alpha = 0.94)
Job satisfaction scale	1	(21)	Job satisfaction	Previously tested	(21) Internal consistency (Cronbach's alpha = 0.89)
Medical Outcomes Study (MOS) Sleep Scale	1	(34)	Sleep	Previously tested	(34) Internal consistency (Cronbach's alpha = 0.73)
Minnesota Satisfaction Questionnaire	1	(51)	Job satisfaction	Previously tested	(51) Internal consistency (Cronbach's alpha = 0.941)
Positive and Negative Affect Schedule (PANAS) scales	1	(32)	Wellbeing	0	(32) Internal consistency (Cronbach's alpha = 0.88-92)
State-Trait Anxiety Inventory	1	(37)	Anxiety	Previously tested	(37) Test-retest
State-Trait Depression Scale	1	(20)	Depression	Previously tested	(20) Internal consistency (Cronbach's alpha = 0.88-90)
A modifield questionnaire by Buckey and Harasym	1	(65)	Stress	0	0
Arora et al. 2010 questionnaire	1	(43)	Fatigue	0	0
Baldwin & Daugherty. 2004 questionnaire	1	(72)	Stress, sleep	Previously tested	0
Beck depression and anxiety inventories	1	(63)	Depression, anxiety	Previously tested	Previously tested
Brief COPE	1	(75)	Stress	Previously tested	0
Bu et al. 2019 questionnaire	1	(52)	Stress, wellbeing	0	0
Burnout measure (BM)	1	(22)	Burnout	Previously tested	Previously tested
Cedfeldt et al. 2010 questionnaire	1	(56)	Stress, job satisfaction,	Previously tested	0

			wellbeing, sleep		
Choi et al. 2006 questionnaire	1	(82)	Job satisfaction	Previously tested	0
Depression, Anxiety and Stress Scales	1	(47)	Depression, anxiety, stress	Previously tested	Previously tested
Epworth Sleepiness Scale	1	(74)	Sleep	Previously tested	Previously tested
Eurohis quality of life	1	(47)	Quality of life	Previously tested	Previously tested
Generalised anxiety disorder-7 (GAD-7)	1	(22)	Anxiety	Previously tested	Previously tested
Health Consultant's Job Stress and Satisfaction questionnaire	1	(46)	Job satisfaction	0	0
Jagsi 2008 questionnaire	1	(79)	Fatigue	0	0
Jefferson Physician Empathy Scale	1	(2)	Empathy	Previously tested	0
Kalmbach et al. 2018 questionnaire	1	(30)	Sleep, mood	0	0
Kashner et al. 2010 questionnaire	1	(77)	Stress, fatigue	0	0
Kazmi et al. 2008 questionnaire	1	(54)	Stress	0	0
Kessler Psychological Distress Scale	1	(62)	Anxiety, depression	0	0
Marek et al. 2019 questionnaire	1	(80)	Burnout, sleep	Previously tested	0
Mataya et al. 2015 questionnaire	1	(33)	Job satisfaction, quality of life	0	0
Modified AMA survey	1	(5)	Stress, sleep, job satisfaction	0	0
Positive states of mind	1	(49)	Stress	Previously tested	Previously tested
Quality of life inventory	1	(76)	Quality of life	Previously tested	Previously tested
Satisfaction with Life Scale	1	(17)	Life satisfaction	Previously tested	Previously tested
Sources of Stress Scale (SSS)	1	(85)	Stress	0	0

Spielberger's Situational Anxiety Inventory	1	(29)	Anxiety	Previously tested	Previously tested
Stress inventory	1	(76)	Stress	0	0
Stress Profile	1	(49)	Stress	0	Previously tested
Swaid et al. 2017 questionnaire	1	(92)	Job satisfaction	0	0

Theme 2: Educational environment

Tool name	Time used	Reference	Sub-themes	Internal validity evidence	Reliability evidence
UK Medical Career Research Group survey	5	(26,53,60,81,89)	Support, handoff, induction, supervision, teaching, feedback, preparedness	0	0
PHEEM	4	(15,24,35,85)	Educational environment, supervision, induction, communication, feedback, career development, teamwork, teaching, support	(24) Face validity, construct validity (three factors) (15) construct validity (one factor)	(24) Internal consistency (Cronbach's alpha = 0.93) (15) Internal consistency (Cronbach's alpha = 0.84)
Accreditation Council for Graduate Medical Education Resident Survey	2	(16,70)	Teamwork, educational experience, handoff	0	0
Junior Doctor Assessment Tool	2	(14,23)	Communication, teamwork, professionalism	(14) Face validity, construct validity (three factors)	(14) Internal consistency (Cronbach's alpha = 0.883)
Climate for learning	1	(86)	Learning environment, support	(86) Construct validity (two factors)	(86) Internal consistency (Cronbach's alpha = 0.77)

Cognitive Behaviour Survey - Residency	1	(6)	Learning environment	(6) Construct validity (seven factors)	(6) Internal consistency (Cronbach's alpha = 0.85-89)
Friesen et al. 2008 questionnaire	1	(34)	Teamwork	0	(34) Internal consistency (Cronbach's alpha = 0.89)
Graduate Medical Education Committee annual survey	1	[64]	Supervision, feedback	[64] Construct validity, content validity, discriminate validity	[64] Internal consistency (Cronbach's alpha = 0.83-87)
Handoff Clinical Evaluation Exercise	1	[65]	Professionalism, communication, feedback, handoff	Previously tested	[65] Internal consistency (Cronbach's alpha = 0.98); Inter-rater reliability (ICC overall performance (0.18))
Hannan et al. 2017 questionnaire	1	[4]	Support, preparedness, teamwork	[4] Face validity	0
Learning environment professionalism survey	1	[66]	Learning environment	Previously tested	[66] Internal consistency (Cronbach's alpha = 0.78-88); test-retest reliability
Lubben Social Network Scale	1	[22]	Support	0	[22] Internal consistency (Cronbach's alpha = 0.75-84)
Mentorship effectiveness Scale	1	[30]	Supervision	Previously tested	[30] Internal consistency (Cronbach's alpha = 0.931)
Modified Resident Questionnaire	1	[67]	Learning environment	0	[67] Internal consistency (Cronbach's alpha = 0.84)
Reynolds et al. 2019 questionnaire	1	[68]	Professionalism	0	[68] Internal consistency (Cronbach's alpha unknown)
Safety Attitudes Questionnaire	1	[69]	Teamwork, professionalism	[69] Concurrent validity	Previously tested
Short Survey of Perceived Organizational Support	1	[70]	Support, learning environment	[70] Construct validity, concurrent validity	[70] Internal consistency (Cronbach's alpha = 0.94)
Speaking Up Climates	1	[69]	Teamwork, professionalism	[69] Face validity, concurrent validity, discriminate validity, construct validity (one factor)	[69] Internal consistency (Cronbach's alpha > 0.70)
Touchie et al. 2014 questionnaire	1	[71]	Supervision	[71] Face validity	0
Work Analysis Instrument for Hospitals	1	[72]	Teaching, support	Previously tested	[72] Internal consistency (Cronbach's alpha = 0.64-87)

Yusoff et al. 2011 questionnaire	1	[16]	Teamwork, supervision, support	Previously tested	[16] Internal consistency (Cronbach's alpha for individual tools including GSQ)
A 60-item instrument developed by Bellini	1	[73]	Feedback, learning environment, supervision	0	0
Abuhusain et al. 2009 questionnaire	1	[74]	Preparedness, induction, learning environment	0	0
Arora et al. 2010 questionnaire	1	[34]	Supervision	0	0
Baldwin & Daugherty 2004 questionnaire	1	[35]	Supervision, overall educational experience, professionalism	Previously tested	0
Baldwin et al. 2018 questionnaire	1	[75]	Supervision	0	0
Bola et al. 2015 questionnaire	1	[76]	Supervision, teaching, handoff, induction	Previously tested	0
Burford et al. 2014 questionnaire	1	[77]	Preparedness, overall educational experience	0	0
Chu et al. 2009 questionnaire	1	[78]	Handoff, supervision	0	0
Copenhagen Psychosocial Questionnaire	1	[3]	Support	Previously tested	Previously tested
Doran et al. 2007 questionnaire	1	[79]	Preparedness, supervision	0	0

Finucane & O'Dowd 2005 questionnaire	1	[80]	Teaching, feedback, preparedness	0	0
Han & Maxwell 2006 questionnaire	1	[81]	Preparedness	0	0
Hoppe et al. 2009 questionnaire	1	[82]	Preparedness, feedback, supervision, communication, training	Previously tested	0
Kashner et al. 2010 questionnaire	1	[43]	Supervision, learning environment, support, teamwork, teaching	0	0
Kazmi et al. 2008 questionnaire	1	[44]	Communication, supervision	0	0
Kelly et al. 2011 questionnaire	1	[83]	Preparedness	0	0
Linklater 2010 questionnaire	1	[84]	Preparedness, support	0	0
Mataya et al. 2015 questionnaire	1	[47]	Learning environment, supervision, career development	0	0
McKavanagh et al. 2012 questionnaire	1	[85]	Supervision, feedback	0	0
Miles et al. 2015 questionnaire	1	[86]	Induction	0	0
Modified AMA survey	1	[48]	Supervision, professionalism	0	0
Modified Manchester Questionnaire	1	[87]	Preparedness	0	0

Modified questionnaire by Buckey and Harasym	1	[33]	Supervision, feedback, communication	0	0
Operating Team Resource Management Survey	1	[88]	Teamwork, professionalism	0	0
Rodger et al. 2002 questionnaire	1	[14]	Support, supervision	0	0
Ross et al. 2018 questionnaire	1	[89]	Supervision, teaching	0	0
Sarason Social Support Questionnaire	1	[7]	Support	0	0
Swaid et al. 2017 questionnaire	1	[52]	Induction, preparedness, teaching	0	0

Theme 3: Work condition and environment

Tool name	Time used	Reference	Sub-themes	Internal validity evidence	Reliability evidence
PHEEM	4	[49,56–58]	Work hour, harassment or bullying, safety, food and accommodation	[57] Face validity, construct validity (three factors) [56] construct validity (one factor)	[57] Internal consistency (Cronbach's alpha = 0.93) [56] Internal consistency (Cronbach's alpha = 0.84)
UK Medical Career Research Group survey	3	[25,26,55]	Workload, food and accommodation, remuneration	0	0
Accreditation Council for Graduate Medical Education Resident Survey	2	[59,60]	Workload, safety	0	0
Cyber Negative Acts Questionnaire	1	[31]	Bullying	Previously tested	[31] Internal consistency (Cronbach's alpha = 0.85)
Graduate Medical Education Committee annual survey	1	[64]	Workload	[64] Construct validity, content validity, discriminate validity	[64] Internal consistency (Cronbach's alpha = 0.83-87)
Hannan et al. 2017 questionnaire	1	[4]	Workload	[4] Face validity	0

Modified Resident Questionnaire	1	[67]	Workload	0	[67] Internal consistency (Cronbach's alpha = 0.85)
Psychological Safety Scale	1	[70]	Safety	[70] Concurrent validity	[70] Internal consistency (Cronbach's alpha = 0.76)
Robson et al. 2011 questionnaire	1	[90]	Safety	[90] Content validity (0.88), construct validity	0
Safety Attitudes Questionnaire	1	[69]	Safety	[69] Concurrent validity	Previously tested
Speaking Up Climates	1	[69]	Safety	[69] Face validity, concurrent validity, discriminate validity, construct validity (one factor)	[69] Internal consistency (Cronbach's alpha > 0.70)
Work Analysis Instrument for Hospitals	1	[72]	Workload	Previously tested	[72] Internal consistency (Cronbach's alpha = 0.64-87)
Yusoff et al. 2011 questionnaire	1	[16]	Workload, pay and remuneration, work-family conflict	Previously tested	[16] Internal consistency (Cronbach's alpha for individual tools including GSQ)
A 60-item instrument developed by Bellini	1	[73]	Workload, infrastructure, harassment, pay and remuneration, food and accommodation	0	0
Arora et al. 2010 questionnaire	1	[34]	Workload	0	0
Baldwin & Daugherty 2004 questionnaire	1	[35]	Work hours, harassment	Previously tested	0
Bola et al. 2015 questionnaire	1	[76]	Workload, safety	Previously tested	0
Choi et al. 2006 questionnaire	1	[39]	Work hours	0	0
Choi et al. 2017 questionnaire	1	[91]	Work hours	0	0

Doran et al. 2007 questionnaire	1	[79]	Workload	0	0
Finucane & O'Dowd 2005 questionnaire	1	[80]	Accommodation, pay, harassment, workload	0	0
Friesen et al. 2008 questionnaire	1	[28]	Work hours	0	0
Hinze 2004 questionnaire	1	[92]	Harassment	0	0
Jagsi et al. 2008 questionnaire	1	[41]	Work hours, safety	0	0
Kashner et al. 2010 questionnaire	1	[43]	Work hours, infrastructure, safety, food and accommodation	0	0
Kazmi et al. 2008 questionnaire	1	[44]	Workload	0	0
Keim et al. 2006 questionnaire	1	[19]	Work hours	0	0
Lau et al. 2017 questionnaire	1	[45]	Work hours	0	0
Mataya et al. 2015 questionnaire	1	[47]	Work hours, pay and remuneration	0	0
Mayer 2017 questionnaire	1	[9]	Work hours	0	0
Modified AMA survey	1	[48]	Work hour, harassment	0	0
Modified questionnaire by Buckey and Harasym	1	[33]	Work hours, food and accommodation, harassment or bullying	0	0
Operating Team Resource Management Survey	1	[88]	Safety	0	0
Rodger et al. 2002 questionnaire	1	[14]	Workload	0	0
Rovik et al. 2007 questionnaire	1	[6]	Work hours	0	0
Sen et al. 2010 questionnaire	1	[7]	Work hours	0	0

Ross et al. 2018 questionnaire	1	[89]	Work hours, infrastructure	0	0
Work and Family Conflict Scale	1	[12]	Work-family conflict	Previously tested	Previously tested

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Appendix 13. Result from Kenya internship experience survey by internship hospital category and gender

		Internship hospital category				Gender		Internship year			Total (n=358)
		Level 4 small hospitals (n=99)	Level 4 large hospitals (n=98)	Level 5&6 hospitals (n=137)	Other hospitals (n=24)	Male (n=183)	Female (n=170)	Current intern (n=131)	Finished between 2020 and 2021 (n=166)	Finished between 2018 and 2019 (n=61)	
q1	(-) I feel that I am unable to balance my work and personal life during my internship.	59%	58%	64%	79%	60%	64%	56%	67%	62%	62%
q2	(-) I feel nervous and/or stressed because of my internship work.	66%	49%	61%	58%	55%	63%	53%	62%	64%	59%
q3	I feel confident about my ability to handle my personal problems during my internship.	41%	50%	40%	38%	50%	36%	47%	39%	48%	43%
q4	(-) I have felt that things have not gone my way in my life.	31%	24%	33%	46%	32%	29%	26%	34%	31%	31%
q5	(-) I find that I could not cope with all the work that I had to do during my internship.	39%	33%	36%	42%	41%	32%	37%	33%	44%	36%
q6	I am able to control irritations in my work and life during my internship.	56%	56%	52%	38%	56%	51%	50%	51%	64%	53%
q7	I feel that I am on top of things at work.	44%	44%	48%	42%	47%	45%	47%	45%	46%	46%
q8	(-) I am angered because of things that were outside of my control.	57%	54%	45%	38%	54%	45%	47%	51%	53%	50%
q9	(-) I feel that difficulties at work are piling up so high that I could not overcome them.	30%	25%	30%	25%	32%	25%	28%	28%	31%	28%
q10	(-) I have little interest or pleasure in doing things that I used to enjoy.	23%	25%	27%	46%	22%	30%	29%	27%	21%	27%
q11	(-) I feel down, depressed, or hopeless because of my internship work.	26%	18%	27%	29%	21%	28%	25%	25%	23%	25%
q12	(-) I have sleeping problems, either have trouble falling or staying asleep, or sleeping too much.	37%	36%	35%	50%	31%	42%	34%	39%	38%	37%

q13	(-) I feel tired or having little energy during my internship.	52%	48%	54%	63%	47%	57%	48%	55%	54%	52%
q14	(-) I have eating problems, either have poor appetite, or have been overeating.	42%	34%	47%	38%	34%	48%	35%	45%	48%	42%
q15	(-) I have trouble concentrating on things either work-related, or outside of my work.	29%	18%	26%	17%	23%	25%	25%	23%	25%	24%
q16	(-) I have the thoughts that I would be better off dead or of hurting myself in some way.	11%	5%	7%	4%	8%	8%	9%	7%	7%	8%
q17	I get satisfaction from being able to help people.	80%	87%	88%	88%	89%	82%	81%	89%	87%	86%
q18	I feel invigorated and energised after work during my internship.	17%	33%	26%	29%	31%	21%	26%	25%	28%	26%
q19	I like my work as a medical intern.	44%	58%	47%	54%	53%	47%	57%	46%	46%	50%
q20	My ability to keep up with clinical techniques and protocols makes me feel pleased.	70%	80%	75%	71%	75%	73%	73%	76%	74%	74%
q21	My internship work makes me feel satisfied.	54%	66%	59%	50%	63%	55%	59%	60%	57%	59%
q22	I believe I can make a difference through my work.	75%	86%	74%	63%	79%	74%	74%	79%	75%	77%
q23	I am proud of what I can do to help as a medical intern.	81%	84%	81%	83%	85%	78%	79%	86%	79%	82%
q24	I believe that I am a success as a medical intern.	73%	71%	80%	63%	78%	72%	70%	80%	72%	75%
q25	I am happy that I chose to do this work.	55%	68%	64%	58%	69%	56%	60%	63%	64%	62%
q26	My internship experience met my expectation.	38%	54%	47%	42%	53%	41%	45%	46%	49%	46%
q27	(-) I am not as productive at work because I am losing sleep over work-related traumatic experiences.	24%	18%	21%	21%	19%	24%	21%	21%	21%	21%
q28	(-) I feel trapped by my job as a medical intern.	34%	36%	32%	33%	34%	32%	40%	31%	28%	34%
q29	(-) I feel worn out because of my work as a medical intern.	58%	53%	56%	50%	53%	57%	50%	56%	64%	55%
q30	(-) I feel overwhelmed because my case workload seems endless during the internship.	56%	50%	61%	46%	54%	57%	45%	59%	69%	56%
q31	(-) I feel bogged down and held back by the internship hospital.	43%	28%	39%	38%	39%	34%	34%	39%	38%	37%
q32	(-) I am preoccupied by concerns about multiple patients during my internship.	59%	47%	58%	42%	56%	52%	47%	57%	64%	54%
q33	(-) I find it difficult to separate my personal life from my life as a medical intern.	44%	38%	48%	50%	46%	43%	39%	45%	54%	44%

q34	(-) I have been affected by the hardship and stress experienced by those patients I help.	35%	22%	36%	17%	32%	29%	29%	32%	31%	31%
q35	(-) I have felt on edge about various things because of my work helping patients.	40%	25%	35%	17%	33%	32%	30%	36%	28%	32%
q36	(-) I avoid certain activities or situations because they remind me of frightening experiences of the patients I help.	19%	18%	18%	13%	16%	19%	20%	18%	13%	18%
q37	(-) As a result of my helping, I have intrusive, frightening thoughts.	18%	14%	9%	0%	11%	14%	13%	10%	16%	12%
q38	My clinical supervisors have set clear expectations	61%	71%	68%	50%	64%	69%	61%	66%	74%	66%
q39	I have good clinical supervision at all times during my internship.	44%	61%	63%	58%	60%	55%	56%	56%	62%	57%
q40	Time for my own reading, training and education is allocated by the hospital during my internship.	13%	26%	18%	33%	18%	22%	21%	19%	18%	20%
q41	My clinical supervisors have good communication skills.	59%	64%	50%	50%	58%	55%	60%	55%	53%	56%
q42	I am able to participate actively in educational sessions (e.g. continuing medical education) during my internship.	61%	67%	66%	67%	62%	67%	57%	69%	71%	65%
q43	My clinical supervisors are enthusiastic about teaching and supervision.	50%	63%	59%	63%	59%	58%	59%	59%	53%	58%
q44	I have access to educational sessions and programmes that are relevant to my needs during my internship	34%	43%	51%	46%	44%	44%	41%	45%	49%	44%
q45	The clinical supervisors provide me with regular feedback.	38%	49%	50%	58%	47%	48%	41%	52%	46%	47%
q46	I have enough clinical learning opportunities for my needs during the internship period.	54%	64%	66%	54%	61%	64%	60%	62%	64%	62%
q47	My clinical supervisors are accessible for teaching and supervision.	58%	65%	66%	63%	65%	63%	66%	61%	64%	63%
q48	My clinical supervisors encourage me to be an independent learner.	68%	76%	67%	71%	72%	69%	67%	70%	75%	70%
q49	The clinical supervisors provide me with feedback on my strengths and weaknesses to ensure my professional development.	46%	56%	56%	54%	57%	50%	53%	51%	56%	53%
q50	My clinical supervisors have good mentoring skills.	49%	56%	58%	58%	58%	54%	59%	53%	53%	55%

q51	I have opportunities to acquire the appropriate practical procedures for clinical practice during my internship.	73%	83%	73%	75%	80%	72%	75%	77%	75%	76%
q52	My internship training makes me feel ready to be an independent medical practitioner.	72%	82%	80%	71%	84%	72%	78%	78%	74%	77%
q53	My clinical supervisors promote an atmosphere of mutual respect.	59%	69%	56%	50%	62%	58%	63%	61%	53%	60%
q54	(-) I am pre-occupied with administrative work that impeded my ability to learn.	16%	16%	21%	17%	21%	14%	21%	16%	16%	18%
q55	I had an informative internship induction programme.	40%	43%	59%	50%	53%	45%	46%	51%	49%	49%
q56	There is an informative and comprehensive internship guideline, log book or clinical diary.	77%	86%	84%	83%	84%	81%	81%	83%	84%	82%
q57	I have the appropriate level of responsibility as a medical intern.	63%	67%	66%	71%	71%	60%	70%	65%	61%	66%
q58	I feel part of a team working here.	64%	75%	75%	67%	75%	67%	66%	74%	75%	71%
q59	There are clear clinical protocols and guidelines across all departments in the internship hospital.	33%	43%	57%	46%	48%	45%	42%	47%	51%	46%
q60	I have the opportunity to provide continuity of care for patients during my internship.	72%	81%	81%	79%	77%	81%	73%	83%	77%	78%
q61	I have good collaboration with other medical practitioners, interns and clinical staff.	85%	83%	83%	88%	84%	84%	80%	86%	85%	84%
q62	I have suitable access to careers advice services or advisors during my internship.	38%	34%	37%	50%	43%	32%	41%	36%	34%	37%
q63	There are good counselling opportunities for medical interns who fail to complete their training satisfactorily.	13%	24%	21%	38%	23%	19%	25%	16%	23%	21%
q64	I have a contract of employment or other document that provides information about hours of work during my internship.	25%	20%	29%	38%	28%	24%	26%	27%	25%	26%
q65	My work hours are appropriate during my internship.	15%	19%	20%	33%	22%	17%	23%	17%	18%	19%
q66	My workload is reasonable during my internship.	13%	28%	18%	50%	22%	22%	28%	18%	16%	22%
q67	(-) I am bleeped or called concerning the patients inappropriately during my internship.	54%	52%	47%	63%	56%	47%	44%	56%	53%	51%
q68	(-) I have to perform inappropriate tasks during my internship.	42%	32%	39%	54%	44%	35%	37%	41%	38%	39%

q69	(-) There is gender discrimination in my internship hospital.	17%	17%	14%	13%	13%	19%	15%	16%	16%	16%
q70	(-) There are other forms of discrimination (e.g. ethnicity, religion, tribe, disability) in my internship hospital.	26%	26%	27%	33%	26%	28%	24%	30%	23%	27%
q71	There is a no-blame culture in my internship hospital.	18%	21%	29%	17%	23%	24%	24%	21%	26%	23%
q72	I would feel safe being treated as a patient in my internship hospital.	29%	31%	49%	50%	39%	38%	36%	38%	46%	39%
q73	Medical errors are handled appropriately in my internship hospital.	43%	52%	53%	58%	51%	51%	50%	50%	54%	51%
q74	I know the proper channels to direct questions regarding patient safety.	55%	51%	61%	67%	61%	52%	59%	54%	59%	57%
q75	(-) It is difficult to discuss medical errors in my internship hospital.	41%	29%	33%	33%	34%	34%	36%	34%	30%	34%
q76	I am encouraged by my colleagues to report any patient safety concerns I may have.	46%	42%	56%	58%	54%	45%	47%	51%	51%	49%
q77	The culture in my internship hospital makes it easy to learn from the errors of others.	47%	55%	53%	50%	57%	47%	53%	51%	51%	52%
q78	I know the proper channels to direct questions regarding my own safety.	42%	43%	46%	58%	55%	34%	49%	44%	39%	45%
q79	(-) I feel emotionally vulnerable within my internship hospital environment	37%	37%	40%	33%	34%	41%	39%	38%	36%	38%
q80	I feel physically safe within my internship hospital.	67%	78%	72%	63%	75%	68%	72%	72%	69%	72%
q81	(-) I get bullied or victimised within my internship hospital.	29%	22%	27%	29%	23%	30%	23%	31%	23%	27%
q82	There are clear and updated patient safety protocols in the internship hospital.	26%	29%	47%	58%	42%	32%	39%	37%	31%	37%
q83	There are adequate infection prevention and control measures.	46%	54%	61%	71%	57%	54%	53%	55%	59%	55%
q84	I can report any concern and receive responsive feedback in my internship hospital.	35%	39%	41%	46%	43%	36%	47%	34%	34%	39%
q85	The internship hospital has good quality accommodation for me when on call.	23%	38%	36%	63%	34%	35%	35%	35%	33%	35%
q86	There are adequate catering services provided by the internship hospital when I am on call.	7%	18%	20%	38%	16%	19%	18%	18%	15%	17%
q87	The internship hospital has good internet connection for my study and work need.	16%	17%	27%	46%	25%	20%	24%	22%	21%	23%

q88	The internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need.	21%	30%	42%	54%	34%	32%	34%	34%	33%	34%
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Note: Data is presented as the proportion of respondents that chose “agree” and “strongly agree” or “often” and “very often”. Items with a “(-)” are “negative items” where disagreement is interpreted as favourable thus the lower proportion the better experience.

Appendix 14. Changes to MIES items from original tools to post-content validity discussion

Left hand side items in black are original tool items, and items on the right hand in red are items changed after discussions with target population.

The questions in this section will ask you about your feelings and thoughts during your internship year. **Please reflect on your whole internship experience in all department rotations rather than your current department rotation.** Please circle how often you felt or thought a certain way.

5 = Very Often	4 = Often	3 = Sometimes	2 = Rarely	1 = Never
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Domain A. Stress

#	During your internship year, how often have you been bothered by any of the following feelings or thoughts?	During your internship year, how often have you been bothered by any of the following feelings or thoughts?
A1	I am upset because of something that happened unexpectedly.	I am upset because of unexpected work-related incidents.
A2	I feel that I am unable to control the important things in my life.	I feel that I am unable to balance my work and personal life.
A3	I feel nervous and “stressed”.	I feel nervous and/or “stressed” because of my work.
A4	I feel confident about my ability to handle my personal problems.	I feel confident about my ability to handle my personal problems. (No change)
A5	I feel that things were not going my way.	I feel that things were not going my way. (no change)
A6	I find that I could not cope with all the things that I had to do.	I find that I could not cope with all the work that I had to do.
A7	I am able to control irritations in my life.	I am able to control irritations in my work and life.
A8	I feel that I am on top of things.	I feel that I am on top of things. (no change)
A9	I am angered because of things that were outside of my control.	I am angered because of things that were outside of my control. (No change)
A10	I feel that difficulties are piling up so high that I could not overcome them.	I feel that difficulties at work are piling up so high that I could not overcome them.

Domain B. Depression

#	During your internship year, how often do you experience these feelings or thoughts?	During your internship year, how often do you experience these feelings or thoughts?
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B1	I have little interest or pleasure in doing things.	I have little interest or pleasure in doing things that I used to enjoy.
B2	I feel down, depressed, or hopeless.	I feel down, depressed, or hopeless because of my work.
B3	I have trouble falling or staying asleep, or sleeping too much.	I have trouble falling or staying asleep, or sleeping too much. (No change)
B4	I feel tired or having little energy.	I feel tired or having little energy. (No change)
B5	I have poor appetite, or overeating.	I have poor appetite, or overeating. (No change)
B6	I feel bad about myself—or that I am a failure or have let myself or my family down.	I feel bad about myself—or that I am a failure or have let myself or my family down. (No change)
B7	I have trouble concentrating on things, such as reading newspaper or watching television.	I have trouble concentrating on things either work-related, or outside of my work.
B8	I move or speak so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that I move around a lot more than usual?	I move or speak so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that I move around a lot more than usual?
B9	I have the thoughts that I would be better off dead or of hurting myself in some way.	I have the thoughts that I would be better off dead or of hurting myself in some way. (No change)

When you help people, you have direct contact with their lives. As you may have found, your compassion for those you help can affect you in positive and negative ways. Below are some questions about your experiences, both positive and negative, as a helper. **Consider each of the following questions about you and your work situation during your whole internship.** Select the number that honestly reflects how frequently you experienced these things during your internship year.

Domain C. Satisfaction

#	During your internship year, how often do you experience these things?	During your internship year, how often do you experience these things?
C1	I am happy.	I am happy.
C2	I get satisfaction from being able to help people.	I get satisfaction from being able to help people. (No change)
C3	I feel invigorated after working with those I help.	I feel invigorated after work.
C4	I like my work as a helper.	I like my work as a helper during internship.
C5	I am pleased with how I am able to keep up with helping techniques and protocols.	I am pleased with how I am able to keep up with clinical techniques and protocols.
C6	My work makes me feel satisfied.	My work makes me feel satisfied.

C7	I have happy thoughts and feelings about those I help and how I could help them.	I have happy thoughts and feelings about those I help and how I could help them.
C8	I believe I can make a difference through my work.	I believe I can make a difference through my work.
C9	I am proud of what I can do to help.	I am proud of what I can do to help.
C10	I have thoughts that I am a "success" as a helper.	I believe that I am a "success" as a medical intern.
C11	I am happy that I chose to do this work.	I am happy that I chose to do this work. (No change)
C12		My internship experience met my expectation
D5		I am the person I always wanted to be.

Domain D. Burnout

#	During your internship year, how often do you experience these things?	During your internship year, how often do you experience these things?
D1	I feel connected to others.	I feel connected to others.
D2	I am not as productive at work because I am losing sleep over traumatic experiences of a person I help.	I am not as productive at work because I am losing sleep over work-related traumatic experiences.
D3	I feel trapped by my job as a helper.	I feel trapped by my job as a medical intern.
D4	I have beliefs that sustain me.	I have beliefs that sustain me.
D5 5	I am the person I always wanted to be.	(Moved to domain C)
D6	I feel worn out because of my work as a helper.	I feel worn out because of my work as a medical intern.
D7	I feel overwhelmed because my case workload seems endless.	I feel overwhelmed because my case workload seems endless. (No change)
D8	I feel "bogged down" by the system.	I feel "bogged down" by the hospital.
D9	I am a very caring person.	I am a very caring person.

Domain E. Compassion fatigue

#	During your internship year, how often do you experience these things?	During your internship year, how often do you experience these things?
E1	I am preoccupied with more than one person I help.	I am preoccupied with more than one patient I am approaching and helping.

E2	I jump or am startled by unexpected sounds.	I jump or am startled by unexpected sounds.
E3	I find it difficult to separate my personal life from my life as a helper.	I find it difficult to separate my personal life from my life as a medical intern.
E4	I think that I might have been affected by the traumatic stress of those I help.	I think that I might have been affected by the traumatic stress of those patient I help.
E5	Because of my helping, I have felt "on edge" about various things.	Because of my helping at work, I have felt "on edge" about various things.
E6	I feel depressed because of the traumatic experiences of the people I help.	I feel depressed because of the traumatic experiences of the patient I help.
E7	I feel as though I am experiencing the trauma of someone I have helped.	I feel as though I am experiencing the trauma of the patient I have helped.
E8	I avoid certain activities or situations because they remind me of frightening experiences of the people I help.	I avoid certain activities or situations because they remind me of frightening experiences of the patient I help.
E9	As a result of my helping, I have intrusive, frightening thoughts.	As a result of my helping, I have intrusive, frightening thoughts. (No change)
E10	I can't recall important parts of my work with trauma victims.	I can't recall important parts of my work with trauma victims. (No change)

5 = Strongly agree	4 = Agree	3 = Neutral	2 = Disagree	1 = Strongly disagree
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This section as your perception of the internship training centre you are currently affiliated with or previously affiliated with. Please circle to what extent do you agree with these statements.

Domain F. Teaching and supervision

#	To what extent do you agree with the following statements?	To what extent do you agree with the following statements?
F1	My clinical teachers set clear expectations	My clinical teachers have set clear expectations
F2	I have good clinical supervision at all times	I have good clinical supervision at all times (No change)
F3	I have protected educational time in this post	I have allocated time for training and education during internship.
F4	My clinical teachers have good communication skills	My clinical teachers have good communication skills (No change)
F5	I am able to participate actively in educational events	I am able to participate actively in educational sessions

F6	My clinical teachers are enthusiastic	My clinical teachers are enthusiastic about teaching and supervision
F7	There is access to an educational programme relevant to my needs	There is access to an educational programme relevant to my needs (no change)
F8	I get regular feedback from seniors	The clinical teachers provide me with regular feedback
F9	My clinical teachers are well organised	My clinical teachers are well organised (No change)
F10	I have enough clinical learning opportunities for my needs	I have enough clinical learning opportunities for my needs (No change)
F11	My clinical teachers have good teaching skills	My clinical teachers have good teaching skills (No change)
F12	My clinical teachers are accessible	My clinical teachers are accessible (No change)
F13	Senior staff utilize learning opportunities effectively	My clinical teachers and other staff utilize different learning opportunities effectively
F14	My clinical teachers encourage me to be an independent learner	My clinical teachers encourage me to be an independent learner (No change)
F15	The clinical teachers provide me with good feedback on my strengths and weaknesses	The clinical teachers provide me with feedback on my strengths and weaknesses
F16	My clinical teachers have good mentoring skills	My clinical teachers have good mentoring skills (No change)
F17	I have opportunities to acquire the appropriate practical procedures for my grade	I have opportunities to acquire the appropriate practical procedures for my clinical practice
F18	The training in this post makes me feel ready to be a medical officer	My internship training makes me feel ready to be an independent medical practitioner
F19	My clinical teachers promote an atmosphere of mutual respect	My clinical teachers promote an atmosphere of mutual respect (No change)
F20		I am pre-occupied with administrative work that impeded my ability to learn

Domain G. Organizational support

#	To what extent do you agree with the following statements?	To what extent do you agree with the following statements?
G1	I had an informative induction programme	I had an informative induction programme (No change)

G2	There is an informative Internship Guideline and Log book	There is an informative and comprehensive internship guideline, log book or clinical diary
G3	I have the appropriate level of responsibility in this post	I have the appropriate level of responsibility as a medical intern
G4	I feel part of a team working here	I feel part of a team working here (No change)
G5	There are clear clinical protocols in this post	There are clear clinical protocols
G6	I have the opportunity to provide continuity of care	I have the opportunity to provide continuity of care (No change)
G7	I have good collaboration with other doctors in my grade	I have good collaboration with other medical practitioners, interns and clinical staff
G8	I have suitable access to careers advice	I have suitable access to careers advice services and/or advisors
G9	There are good counselling opportunities for junior doctors who fail to complete their training satisfactorily	There are good counselling opportunities for medical interns who fail to complete their training satisfactorily

Domain H. Work condition and safety climate

#	To what extent do you agree with the following statements?	To what extent do you agree with the following statements?
H1	I have a contract of employment that provides information about hours of work	I have a contract of employment or other document that provides information about hours of work
H2	My hours conform to the General Wages Order	My work hours is appropriate
H3	My workload in this job is fine	My workload in this job is fine (No change)
H4	I am bleeped inappropriately	I am bleeped or called concerning the patients inappropriately
H5	I have to perform inappropriate tasks	I have to perform inappropriate tasks
H6	There is sex discrimination in this post	There is gender discrimination
H7	There are other forms of discrimination in this post (other than sex discrimination)	There are other forms of discrimination (e.g. ethnicity, religion, tribe, disability)
H9	There is a no-blame culture in this post	There is a no-blame culture
H10	I get a lot of enjoyment out of my present job	I get a lot of enjoyment out of my present job
J1	I would feel safe being treated here as a patient	I would feel safe being treated here as a patient (No change)
J2	Medical errors are handled appropriately in my clinical area	Medical errors are handled appropriately here (No change)

J3	I know the proper channels to direct questions regarding patient safety in my clinical area	I know the proper channels to direct questions regarding patient safety (No change)
J4	I receive appropriate feedback about my performance	I receive appropriate feedback about my performance
J5	In my clinical area, it is difficult to discuss errors	It is difficult to discuss errors (No change)
J6	I am encouraged by my colleagues to report any patient safety concerns I may have	I am encouraged by my colleagues to report any patient safety concerns I may have (No change)
J7	The culture in my clinical area makes it easy to learn from the errors of others	The culture in my clinical area makes it easy to learn from the errors of others (No change)
J8		I know the proper channels to direct questions regarding my own safety
J9		I feel emotionally vulnerable within the hospital environment
H8	I feel physically safe within the hospital environment	I feel physically safe within the hospital environment (No change)
J10		I get bullied or victimised within the hospital environment
J11		There are clear and updated patient safety protocols (No change)
J12		There is adequate infection prevention and control measures
J13		I can report any concern and receive responsive feedback.

Domain I. Physical and financial resource

#	To what extent do you agree with the following statements?	To what extent do you agree with the following statements?
I1	This hospital has good quality accommodation for me, especially when on call	The internship hospital has good quality accommodation for me when on call (No change)
I2	There are adequate catering facilities when I am on call	There are adequate catering services provided by the hospital when I am on call
I3	This hospital has good internet connection for my study and work need	This hospital has good internet connection for my study and work need (No change)
I4	This hospital has adequate amenities and equipment for my study and work need	This hospital has adequate supply of diagnostics, equipment and medication for my study and work need

15	This hospital has adequate supply of diagnostics and medication for my study and work need	This hospital has adequate supply of medication for my study and work need
16	I receive acceptable pay and remuneration for my study and work need	I receive acceptable pay and remuneration for my study and work need (No change)

Appendix 15. Expert panel members involved in scale evaluation

Name	Affiliation	Expertise
Kun Tang	Tsinghua University, China	Internship
Nathanael Sirili	Muhimbili University of Health and Allied Sciences, Tanzania	Internship
Raymond Tweheyo	Department of Health Policy Planning and Management, School of Public Health, Makerere University, Uganda	Scale development
Mike English	University of Oxford, UK	Internship & scale development
Xiaoming Xu	University Medical Center Groningen, Netherlands	Scale development
Okello Tom Richard	Lira university, Uganda	Internship
Phùng Khánh Lâm	University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam	Scale development
Thai Thanh Truc	Department of Medical Statistics and Informatics, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam	Internship & scale development
Richard Summers	Swansea University, UK	Scale development
Shobhana Nagraj	University of Oxford, UK	Internship & scale development
Sulaiman Jalloh	Ola During Children's Hospital , Sierra Leone	Internship
Nadine Misago	Health Healing Network Burundi, Burundi	Internship & scale development
Desire Habonimana	University of Burundi, Burundi	Internship & scale development
Daniel Mbhthia	KEMRI-Wellcome Trust, Kenya	Internship

Appendix 16. Missing values and inter-total correlations for MIES analysis

Table a. Missing value by items and in countries with over 10 responses

Country	Total	Uganda	Kenya	Vietnam	China	Burundi	Sierra Leone	Nigeria	Fiji	South Africa	Tanzania	Ghana
Sample size	1646	487	358	177	160	120	98	90	42	39	25	17
q1_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q2_pc	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q3_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q4_pc	1.3%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q5_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q6_pc	0.4%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q7_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q8_pc	0.4%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q9_pc	0.4%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q10_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q11_pc	0.6%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q12_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q13_pc	0.1%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q14_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q15_pc	0.2%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q16_pc	1.2%	0.6%	0.8%	1.7%	1.9%	2.5%	3.1%	3.2%	7.1%	7.7%	12.0%	17.6%
q17_pc	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q18_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q19_pc	0.8%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q20_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q21_pc	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q22_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q23_pc	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q24_pc	1.3%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q25_pc	0.4%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q26_pc	1.4%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q27_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q28_pc	0.6%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q29_pc	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q30_pc	0.2%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q31_pc	1.0%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q32_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q33_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q34_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%

q35_pc	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q36_pc	1.0%	0.6%	0.8%	1.7%	1.9%	2.5%	3.1%	3.2%	7.1%	7.7%	12.0%	17.6%
q37_pc	1.2%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q38_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q39_pc	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q40_pc	0.9%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q41_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q42_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q43_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q44_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q45_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q46_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q47_pc	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q48_pc	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q49_pc	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q50_pc	1.0%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q51_pc	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q52_pc	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q53_pc	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q54_pc	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q55_pc	1.1%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q56_pc	1.0%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q57_pc	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q58_pc	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q59_pc	0.8%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q60_pc	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q61_pc	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q62_pc	0.5%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q63_pc	4.6%	0.8%	1.1%	2.3%	2.5%	3.3%	4.1%	4.3%	9.5%	10.3%	16.0%	23.5%
q64_pc	1.2%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q65_pc	0.4%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q66_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q67_pc	1.4%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q68_pc	0.7%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q69_pc	1.2%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q70_pc	1.5%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q71_pc	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q72_pc	1.2%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q73_pc	1.7%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q74_pc	2.0%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q75_pc	1.6%	1.2%	1.7%	3.4%	3.8%	5.0%	6.1%	6.5%	14.3%	15.4%	24.0%	35.3%
q76_pc	1.9%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q77_pc	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

q78_pc	1.8%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q79_pc	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q80_pc	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q81_pc	0.9%	0.6%	0.8%	1.7%	1.9%	2.5%	3.1%	3.2%	7.1%	7.7%	12.0%	17.6%
q82_pc	2.8%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q83_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q84_pc	1.2%	0.4%	0.6%	1.1%	1.3%	1.7%	2.0%	2.2%	4.8%	5.1%	8.0%	11.8%
q85_pc	0.6%	0.2%	0.3%	0.6%	0.6%	0.8%	1.0%	1.1%	2.4%	2.6%	4.0%	5.9%
q86_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q87_pc	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
q88_pc	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table b. Inter-item and item-total correlations for MIES items

Item	Item-test correlation	Item-rest correlation	Average interitem covariance	Alpha
Q1	0.4581	0.4383	0.2997761	0.9658
Q2	0.5888	0.573	0.2980044	0.9655
Q3	0.3945	0.3772	0.3017657	0.9659
Q4	0.4965	0.4789	0.299638	0.9657
Q5	0.5382	0.5222	0.2992985	0.9656
Q6	0.3106	0.2923	0.3028848	0.966
Q7	0.3711	0.3539	0.3021822	0.9659
Q8	0.463	0.4446	0.3001186	0.9657
Q9	0.5529	0.5377	0.2993012	0.9655
Q10	0.466	0.4467	0.2997372	0.9657
Q11	0.6345	0.6198	0.2972076	0.9654
Q12	0.5051	0.485	0.2984925	0.9657
Q13	0.5861	0.5705	0.2982011	0.9655
Q14	0.5143	0.4938	0.2980819	0.9657
Q15	0.5436	0.5276	0.2991956	0.9656
Q16	0.3917	0.3748	0.301897	0.9659
Q17	0.2793	0.263	0.3036898	0.966
Q18	0.4667	0.4484	0.3000484	0.9657
Q19	0.5915	0.577	0.2986353	0.9655
Q20	0.4652	0.45	0.3011341	0.9657
Q21	0.5868	0.5735	0.299367	0.9655
Q22	0.42	0.4034	0.3015109	0.9658
Q23	0.4092	0.3926	0.3016959	0.9658
Q24	0.4372	0.4202	0.3011026	0.9658
Q25	0.5594	0.5443	0.2991695	0.9655
Q26	0.6231	0.6089	0.2978709	0.9654
Q27	0.4807	0.4632	0.3000374	0.9657
Q28	0.5724	0.5551	0.2977941	0.9655
Q29	0.5806	0.5642	0.2979863	0.9655

Q30	0.5695	0.5529	0.2981939	0.9655
Q31	0.6396	0.6246	0.296814	0.9653
Q32	0.3747	0.3551	0.301533	0.9659
Q33	0.4713	0.4515	0.2994757	0.9657
Q34	0.411	0.3919	0.3009653	0.9658
Q35	0.4451	0.4277	0.3008283	0.9658
Q36	0.3738	0.3542	0.3015335	0.9659
Q37	0.4064	0.3882	0.3013053	0.9658
Q38	0.5605	0.5457	0.2992725	0.9655
Q39	0.6372	0.6234	0.2976769	0.9654
Q40	0.5324	0.5148	0.2987565	0.9656
Q41	0.6418	0.6289	0.2980672	0.9654
Q42	0.5459	0.5302	0.2992768	0.9656
Q43	0.6169	0.6034	0.2985037	0.9654
Q44	0.6336	0.6201	0.2979651	0.9654
Q45	0.6068	0.5924	0.2982355	0.9654
Q46	0.5464	0.5315	0.2995764	0.9656
Q47	0.6216	0.6089	0.298781	0.9654
Q48	0.4166	0.4014	0.3019687	0.9658
Q49	0.6051	0.5911	0.2985078	0.9654
Q50	0.6768	0.665	0.2976588	0.9653
Q51	0.4769	0.4624	0.3011753	0.9657
Q52	0.4886	0.4733	0.3006858	0.9657
Q53	0.6612	0.6488	0.2977257	0.9653
Q54	0.1407	0.1182	0.3048978	0.9664
Q55	0.4192	0.4003	0.3008605	0.9658
Q56	0.2942	0.2717	0.3024003	0.9661
Q57	0.5323	0.5166	0.2995299	0.9656
Q58	0.5906	0.5772	0.2992044	0.9655
Q59	0.6173	0.6026	0.2977834	0.9654
Q60	0.5096	0.4951	0.3005707	0.9656
Q61	0.5164	0.5033	0.3010109	0.9656
Q62	0.6002	0.5844	0.2976888	0.9654
Q63	0.591	0.5743	0.2975467	0.9654
Q64	0.4065	0.3836	0.3000663	0.9659
Q65	0.5735	0.5556	0.2974395	0.9655
Q66	0.5779	0.5606	0.2975927	0.9655
Q67	0.3203	0.2986	0.3020851	0.9661
Q68	0.4417	0.4214	0.299982	0.9658
Q69	0.4212	0.4019	0.3007181	0.9658
Q70	0.4146	0.3943	0.3005865	0.9659
Q71	0.2957	0.2742	0.3025409	0.9661
Q72	0.4934	0.4747	0.2992839	0.9657
Q73	0.5864	0.5718	0.2987136	0.9655
Q74	0.5643	0.5496	0.2992657	0.9655
Q75	0.4684	0.451	0.300353	0.9657

Q76	0.5081	0.4929	0.3002988	0.9656
Q77	0.5921	0.5786	0.2991131	0.9655
Q78	0.5973	0.583	0.2985506	0.9655
Q79	0.493	0.4758	0.2998456	0.9657
Q80	0.4911	0.4756	0.3005158	0.9657
Q81	0.5003	0.4827	0.2995547	0.9657
Q82	0.5742	0.5594	0.2989493	0.9655
Q83	0.5443	0.5277	0.2988777	0.9656
Q84	0.6629	0.6502	0.2974477	0.9653
Q85	0.4601	0.438	0.2989835	0.9658
Q86	0.4332	0.4107	0.2995018	0.9659
Q87	0.4395	0.4166	0.2992504	0.9659
Q88	0.5098	0.4901	0.2984895	0.9657
Test scale			0.2996569	0.966

Appendix 17. Three-factor structure for MIES analysis

Table c. Removing MIES items with high communality

Variable	Factor1	Factor2	Factor3	Uniqueness
q84	0.7175	0.0309	0.0424	0.4425
q88	0.6737	0.1285	-0.2806	0.5392
q63	0.6635	0.1232	-0.1118	0.5289
q45	0.6627	-0.0208	0.0993	0.5156
q59	0.6582	-0.0308	0.1249	0.5097
q82	0.6537	0.0205	-0.0053	0.5642
q86	0.6466	0.1267	-0.3657	0.5641
q44	0.6391	0.0163	0.1271	0.5077
q50	0.6348	-0.0293	0.2685	0.4217
q65	0.6337	0.3028	-0.3205	0.4559
q49	0.6313	-0.0893	0.2237	0.4989
q62	0.6225	-0.0051	0.1213	0.5467
q47	0.6171	-0.0304	0.2012	0.5076
q85	0.6165	0.0805	-0.2248	0.6336
q73	0.6076	0.0184	0.0837	0.5775
q83	0.6045	0.0322	-0.0052	0.6206
q66	0.602	0.3619	-0.3406	0.4392
q43	0.5948	-0.0428	0.2375	0.5132
q39	0.5943	-0.0111	0.2288	0.5041
q87	0.5912	0.1691	-0.3337	0.6064
q74	0.5728	-0.0417	0.1722	0.5933
q40	0.5724	0.1825	-0.1577	0.6136
q78	0.5711	0.033	0.1365	0.581
q77	0.5698	-0.011	0.1819	0.5742
q64	0.5535	0.0342	-0.171	0.7194
q41	0.547	0.066	0.2074	0.5359
q76	0.5426	-0.0462	0.1219	0.6645
q72	0.5383	0.0604	-0.0305	0.6929
q46	0.5161	-0.0726	0.2611	0.6048
q53	0.5082	0.098	0.2499	0.5252
q38	0.5024	-0.0915	0.3293	0.5668
q55	0.4975	-0.1386	0.1411	0.7292
q57	0.4674	-0.0706	0.2924	0.6318
q42	0.4634	-0.0431	0.2916	0.6251
q51	0.4128	-0.1361	0.3694	0.6401
q48	0.3961	-0.1416	0.2992	0.7184
q80	0.3379	0.0782	0.2146	0.7511
q75	0.2934	0.1707	0.1221	0.7924
q18	0.2198	0.2166	0.1703	0.7895
q30	0.1303	0.7755	-0.2018	0.3736
q29	0.1497	0.7058	-0.1249	0.4468

q33	0.035	0.6776	-0.1279	0.5596
q13	0.0675	0.6698	0.0368	0.4934
q28	0.048	0.6584	0.0505	0.5152
q2	0.141	0.653	-0.036	0.4977
q35	-0.0492	0.6528	-0.0177	0.6027
q11	-0.0253	0.6337	0.2913	0.4205
q34	-0.0048	0.6261	-0.1042	0.6381
q9	-0.0472	0.6216	0.193	0.532
q1	0.1191	0.6205	-0.1879	0.5929
q14	-0.044	0.6197	0.1249	0.5776
q12	-0.0201	0.6146	0.086	0.5939
q31	0.1892	0.5986	0.0409	0.4951
q32	0.0559	0.5983	-0.2118	0.6519
q15	-0.089	0.5946	0.2683	0.53
q27	-0.136	0.5614	0.2659	0.5924
q36	-0.2327	0.5545	0.2306	0.6487
q10	-0.0754	0.55	0.1725	0.6473
q5	0.0632	0.547	0.1116	0.6156
q8	0.0696	0.5257	0.0003	0.6899
q37	-0.1978	0.5143	0.2875	0.646
q4	-0.0644	0.5128	0.2537	0.6285
q79	0.0758	0.4709	0.0994	0.7012
q16	-0.1433	0.4038	0.3159	0.7182
q81	0.0921	0.3891	0.1884	0.7202
q70	0.0852	0.2842	0.1789	0.8197
q68	0.1871	0.2739	0.0802	0.8194
q3	0.0209	0.2721	0.2548	0.811
q23	-0.0881	0.003	0.7665	0.4518
q22	-0.0299	-0.0205	0.7335	0.4849
q24	-0.0063	0.0444	0.6502	0.5611
q25	0.0479	0.1733	0.6226	0.4877
q20	0.0766	0.0189	0.6156	0.5731
q21	0.1254	0.1556	0.5819	0.4999
q52	0.3175	-0.1561	0.5414	0.5485
q61	0.3471	-0.0926	0.4667	0.5887
q58	0.4381	-0.0847	0.4567	0.5017
q19	0.1031	0.2888	0.4565	0.5617
q60	0.4074	-0.1223	0.4084	0.6026
q26	0.2883	0.1783	0.3882	0.5726
q69	0.099	0.1882	0.2858	0.8061
q7	0.0464	0.2075	0.2649	0.8354

Table d. Removing MIES items with cross-loading

Variable	Factor1	Factor2	Factor3	Uniqueness
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q84	0.7155	0.0285	0.0502	0.4433
q88	0.6774	0.1186	-0.2699	0.5388
q63	0.6639	0.1198	-0.1008	0.528
q45	0.6566	-0.0177	0.1103	0.5155
q59	0.653	-0.0288	0.1329	0.5103
q82	0.6529	0.0177	0.001	0.5642
q86	0.6502	0.1172	-0.353	0.5643
q65	0.6403	0.2909	-0.3076	0.4556
q44	0.6326	0.0211	0.1391	0.5067
q50	0.6262	-0.023	0.2783	0.4218
q49	0.623	-0.0825	0.2322	0.4985
q85	0.62	0.0723	-0.2181	0.6322
q62	0.6148	0.0007	0.1345	0.5456
q66	0.6109	0.3484	-0.3294	0.4381
q47	0.6106	-0.026	0.2093	0.5078
q73	0.6059	0.017	0.0889	0.5783
q83	0.6045	0.0289	0.0002	0.6205
q87	0.5973	0.158	-0.3245	0.6048
q39	0.5874	-0.006	0.237	0.5046
q43	0.585	-0.0351	0.2497	0.5119
q40	0.5776	0.1738	-0.1516	0.6128
q77	0.5668	-0.0091	0.1857	0.5751
q74	0.5656	-0.0362	0.1815	0.5928
q78	0.565	0.0377	0.1472	0.5803
q64	0.5516	0.031	-0.1594	0.7207
q41	0.5419	0.0691	0.2159	0.5367
q76	0.5382	-0.0438	0.1279	0.6645
q72	0.5373	0.0601	-0.0219	0.6918
q46	0.5081	-0.0639	0.2676	0.6042
q53	0.5051	0.1013	0.2552	0.5267
q38	0.4931	-0.0831	0.3353	0.5672
q55	0.4881	-0.1316	0.1512	0.7288
q57	0.4576	-0.0614	0.2999	0.6315
q42	0.4542	-0.0343	0.2998	0.6242
q58	0.4277	-0.0716	0.4608	0.5019
q51	0.4017	-0.1232	0.3749	0.639
q60	0.3961	-0.1088	0.4143	0.6008
q48	0.388	-0.1344	0.3018	0.7189
q61	0.3379	-0.0794	0.4678	0.5897
q80	0.3373	0.0799	0.2146	0.7536
q52	0.3046	-0.1382	0.5434	0.548
q75	0.2969	0.1637	0.1203	0.7984

q26	0.2825	0.1889	0.3949	0.5705
q18	0.2182	0.2223	0.1778	0.7867
q31	0.1948	0.5946	0.0523	0.4947
q29	0.1587	0.6995	-0.111	0.4427
q2	0.1511	0.6468	-0.0279	0.4967
q30	0.1433	0.765	-0.1895	0.3713
q1	0.1327	0.6085	-0.1821	0.5935
q21	0.1176	0.1719	0.5852	0.4975
q81	0.1013	0.3787	0.1821	0.7348
q19	0.1008	0.2989	0.459	0.5621
q79	0.0866	0.4605	0.0968	0.7115
q8	0.0745	0.5227	0.0112	0.6881
q13	0.0737	0.6686	0.0491	0.4881
q5	0.0722	0.5443	0.1146	0.617
q20	0.0668	0.0377	0.6164	0.5711
q32	0.0627	0.5906	-0.1958	0.6506
q28	0.0556	0.6553	0.0598	0.5134
q33	0.0456	0.669	-0.1177	0.5589
q25	0.04	0.191	0.6251	0.4849
q34	0.002	0.6202	-0.0904	0.636
q12	-0.0143	0.6142	0.095	0.5903
q24	-0.0174	0.0658	0.6518	0.5567
q11	-0.0225	0.6394	0.3008	0.4143
q14	-0.0364	0.6173	0.1307	0.5782
q9	-0.0392	0.621	0.1965	0.5335
q35	-0.0408	0.6472	-0.009	0.6022
q22	-0.0418	0.0005	0.732	0.4837
q4	-0.0597	0.5145	0.2571	0.6297
q10	-0.0689	0.5494	0.1765	0.6482
q15	-0.0857	0.599	0.276	0.5258
q23	-0.0986	0.0232	0.762	0.4542
q27	-0.1306	0.5632	0.2686	0.5938
q16	-0.1421	0.4078	0.319	0.7186
q37	-0.195	0.5174	0.2912	0.6459
q36	-0.2289	0.5564	0.2357	0.6472

Table e. MIES factors and item loading (Promax rotation)

Variable	Factor1	Factor2	Factor3	Uniqueness
q84	0.7385	0.0156	0.0164	0.4364
q45	0.6818	-0.0233	0.0656	0.5154

q59	0.6773	-0.0366	0.0847	0.518
q82	0.6771	0.0043	-0.0316	0.5521
q50	0.6677	-0.0372	0.2211	0.4335
q88	0.6605	0.138	-0.295	0.5344
q44	0.6603	0.0105	0.1001	0.5042
q49	0.6579	-0.0948	0.1822	0.51
q63	0.6572	0.1152	-0.1077	0.5339
q47	0.6427	-0.0361	0.1567	0.5183
q62	0.6419	-0.0144	0.0919	0.5493
q73	0.6359	-0.0055	0.0594	0.5705
q43	0.6251	-0.0516	0.1995	0.5189
q83	0.6249	0.0235	-0.0371	0.6109
q86	0.6232	0.1421	-0.3718	0.5639
q39	0.6171	-0.0233	0.2037	0.5101
q85	0.6083	0.0885	-0.2472	0.6281
q77	0.6047	-0.0351	0.1533	0.5703
q74	0.6034	-0.0509	0.1376	0.5903
q78	0.5966	0.0176	0.1159	0.575
q65	0.5787	0.2855	-0.2586	0.5228
q41	0.5709	0.0555	0.1799	0.5385
q87	0.5691	0.1779	-0.335	0.6098
q76	0.5662	-0.0573	0.0956	0.6624
q40	0.557	0.169	-0.1374	0.6281
q72	0.5524	0.0418	-0.0291	0.6842
q46	0.5441	-0.0704	0.2102	0.6216
q64	0.536	0.0298	-0.1612	0.732
q53	0.5353	0.0837	0.2125	0.538
q55	0.5152	-0.1479	0.1264	0.73
q42	0.4976	-0.0556	0.254	0.6343
q57	0.4929	-0.0705	0.2395	0.6575
q80	0.3672	0.0619	0.1857	0.7559
q30	0.0885	0.7899	-0.1747	0.3768
q29	0.1147	0.7137	-0.0933	0.4494
q33	0.0065	0.6974	-0.1178	0.5486
q35	-0.067	0.6797	-0.0263	0.5812
q13	0.0557	0.6674	0.0501	0.4948
q34	-0.0306	0.6623	-0.1165	0.6105
q2	0.1201	0.6581	-0.0214	0.4964
q28	0.0351	0.6573	0.0677	0.513
q1	0.084	0.63	-0.161	0.5991
q32	0.0145	0.6298	-0.1975	0.6374
q9	-0.0368	0.6119	0.1914	0.5366

q14	-0.0322	0.6061	0.1229	0.5881
q31	0.1777	0.6036	0.0415	0.4917
q12	-0.0141	0.5987	0.0953	0.604
q15	-0.0649	0.5766	0.2625	0.5408
q36	-0.2186	0.5561	0.2183	0.6513
q27	-0.121	0.5557	0.2581	0.5956
q5	0.0608	0.5464	0.1121	0.6139
q8	0.057	0.5301	0.0148	0.6847
q10	-0.0539	0.5282	0.165	0.6652
q37	-0.172	0.51	0.2673	0.6559
q4	-0.0483	0.4961	0.2561	0.6334
q79	0.0802	0.4576	0.0978	0.7102
q81	0.1112	0.3678	0.1662	0.7395
q23	-0.0204	-0.0641	0.7939	0.407
q22	0.0332	-0.0815	0.7568	0.4445
q24	0.0504	-0.0106	0.6805	0.5169
q25	0.1001	0.1108	0.6637	0.4377
q20	0.1379	-0.0301	0.6179	0.5578
q21	0.1712	0.0978	0.6173	0.4586
q19	0.1379	0.2313	0.5018	0.5299
q26	0.3177	0.1422	0.4044	0.5569

Table f. Final items included for a three-factor structure

Factor	Item no.	Question	Item loading	Original scale
Factor 1 – Educational and work environment (n=33) (Cronbach's alpha 0.95)	q39	I have good clinical supervision at all times during my internship.	0.6171	Adapted from Postgraduate Hospital Educational Environment Measure (PHEEM)
	q40	Time for my own reading, training and education is allocated by the hospital during my internship.	0.557	
	q41	My clinical supervisors have good communication skills.	0.5709	
	q42	I am able to participate actively in educational sessions (e.g. continuing medical educations) during my internship.	0.4976	
	q43	My clinical supervisors are enthusiastic about teaching and supervision.	0.6251	
	q44	I have access to educational sessions and programmes that are relevant to my needs during my internship	0.6603	
	q45	The clinical supervisors provide me with regular feedback.	0.6818	
	q46	I have enough clinical learning opportunities for my needs during the internship period.	0.5441	
	q47	My clinical supervisors are accessible for teaching and supervision.	0.6427	
	q49	The clinical supervisors provide me with feedback on my strengths and weaknesses to ensure my professional development.	0.6579	
	q50	My clinical supervisors have good mentoring skills.	0.6677	
	q53	My clinical supervisors promote an atmosphere of mutual respect.	0.5353	
	q55	I had an informative internship induction programme.	0.5152	
	q57	I have the appropriate level of responsibility as a medical intern.	0.4929	
	q59	There are clear clinical protocols and guidelines across all departments in the internship hospital.	0.6773	
	q62	I have suitable access to careers advice services or advisors during my internship.	0.6419	
	q63	There are good counselling opportunities for medical interns who fail to complete their training satisfactorily.	0.6572	
	q64	I have a contract of employment or other document that provides information about hours of work during my internship.	0.536	
	q65	My work hours are appropriate during my internship.	0.5787	
	q72	I would feel safe being treated as a patient in my internship hospital.	0.5524	Adapted from Safety Attitude Questionnaire
	q73	Medical errors are handled appropriately in my internship hospital.	0.6359	
	q74	I know the proper channels to direct questions regarding patient safety.	0.6034	
	q76	I am encouraged by my colleagues to report any patient safety concerns I may have.	0.5662	
	q77	The culture in my internship hospital makes it easy to learn from the errors of others.	0.6047	New
	q78	I know the proper channels to direct questions regarding my own safety.	0.5966	
	q80	I feel physically safe within my internship hospital.	0.3672	Adapted from PHEEM
	q82	There are clear and updated patient safety protocols in the internship hospital.	0.6771	New

	q83	There are adequate infection prevention and control measures.	0.6249	New
	q84	I can report any concern and receive responsive feedback in my internship hospital.	0.7385	Adapted from PHEEM
	q85	The internship hospital has good quality accommodation for me when on call.	0.6083	
	q86	There are adequate catering services provided by the internship hospital when I am on call.	0.6232	
	q87	The internship hospital has good internet connection for my study and work need.	0.5691	New
	q88	The internship hospital has adequate supply of diagnostics, equipment and medication for my study and work need.	0.6605	New
Factor 2 – Wellbeing (n=24) (Cronbach's alpha 0.94)	q1	I feel that I am unable to balance my work and personal life during my internship.	0.63	Adapted from Perceived Stress Scale
	q2	I feel nervous and/or stressed because of my internship work.	0.6581	
	q4	I have felt that things have not gone my way in my life.	0.4961	
	q5	I find that I could not cope with all the work that I had to do during my internship.	0.5464	
	q8	I am angered because of things that were outside of my control.	0.5301	
	q9	I feel that difficulties at work are piling up so high that I could not overcome them.	0.6119	
	q10	I have little interest or pleasure in doing things that I used to enjoy.	0.5282	Adapted from Patient Health Questionnaire 9
	q12	I have sleeping problems, either have trouble falling or staying asleep, or sleeping too much.	0.5987	
	q13	I feel tired or having little energy during my internship.	0.6674	
	q14	I have eating problems, either have poor appetite, or have been overeating.	0.6061	
	q15	I have trouble concentrating on things either work-related, or outside of my work.	0.5766	
	q27	I am not as productive at work because I am losing sleep over work-related traumatic experiences.	0.5557	Adapted from Professional Quality of Life Scale
	q28	I feel trapped by my job as a medical intern.	0.6573	
	q29	I feel worn out because of my work as a medical intern.	0.7137	
	q30	I feel overwhelmed because my case workload seems endless during the internship.	0.7899	
	q31	I feel bogged down and held back by the internship hospital.	0.6036	
	q32	I am preoccupied by concerns about multiple patients during my internship.	0.6298	
	q33	I find it difficult to separate my personal life from my life as a medical intern.	0.6974	
	q34	I have been affected by the hardship and stress experienced by those patients I help.	0.6623	
	q35	I have felt on edge about various things because of my work helping patients.	0.6797	
	q36	I avoid certain activities or situations because they remind me of frightening experiences of the patients I help.	0.5561	
	q37	As a result of my helping, I have intrusive, frightening thoughts.	0.51	
	q79	I feel emotionally vulnerable within my internship hospital environment	0.4576	New
	q81	I get bullied or victimised within my internship hospital.	0.3678	New
Factor 3 – Job satisfaction (n=8)	q19	I like my work as a medical intern.	0.5018	Adapted from Professional Quality of Life Scale
	q20	My ability to keep up with clinical techniques and protocols makes me feel pleased.	0.6179	
	q21	My internship work makes me feel satisfied.	0.6173	
	q22	I believe I can make a difference through my work.	0.7568	

(Cronbach's alpha 0.90)	q23	I am proud of what I can do to help as a medical intern.	0.7939	
	q24	I believe that I am a success as a medical intern.	0.6805	
	q25	I am happy that I chose to do this work.	0.6637	
	q26	My internship experience met my expectation.	0.4044	New

Table g. Confirmatory factor analysis for 3-factor structure

Country	RMSEA (≤ 0.06 or 0.08)	CFI (≥ 0.95 or 0.90)	SRMR (≤ 0.08 or 0.10)	Cronbac h's alpha (> 0.80)	Cronbac h's alpha for factor 1	Cronbac h's alpha for factor 2	Cronbac h's alpha for factor 3
Overall (all sample)	0.063	0.772	0.067	0.96	0.95	0.94	0.90
Multigroup (4 country only)	0.081	0.643	0.103	0.96	0.95	0.94	0.91
Kenya	0.071	0.765	0.073	0.97	0.96	0.94	0.91
Uganda	0.067	0.725	0.078	0.95	0.94	0.93	0.87
Vietnam	0.087	0.641	0.087	0.96	0.95	0.93	0.91
China	0.086	0.674	0.088	0.96	0.95	0.94	0.93

Appendix 18. Six-factor structure for MIES analysis

Table a. Remove cross loading

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqueness
q43	0.9584	-0.1154	-0.1802	0.0438	0.0033	-0.0136	0.4136
q50	0.9240	-0.0837	-0.1294	0.0291	0.0760	-0.0522	0.3406
q47	0.9130	-0.0543	-0.2010	0.0451	0.0171	-0.0164	0.4215
q45	0.8894	0.0139	-0.2208	0.0909	-0.0483	-0.0886	0.4346
q41	0.7839	-0.0950	-0.1518	0.0870	0.1852	-0.0879	0.4600
q49	0.7589	0.0526	-0.0292	-0.0123	-0.0500	-0.0667	0.4595
q46	0.7084	0.0123	-0.0182	-0.0017	-0.1067	0.0475	0.5598
q51	0.6945	-0.0801	0.0529	-0.0801	-0.1110	0.1203	0.5889
q48	0.6916	-0.1252	-0.0389	-0.1028	0.0171	0.0438	0.6711
q39	0.6744	0.0464	0.0069	0.0344	0.0304	-0.0936	0.4751
q38	0.6727	-0.0691	0.0847	-0.0589	0.0640	-0.0795	0.5368
q42	0.6324	-0.0215	0.0308	-0.0063	-0.0154	0.0217	0.5976
q53	0.5862	-0.0257	0.0218	0.0877	0.1977	-0.1218	0.4863
q52	0.5777	-0.1338	0.3198	-0.1166	-0.1456	0.1295	0.5163
q44	0.5750	0.2568	-0.0972	0.0538	-0.0737	0.0378	0.4866
q58	0.4690	0.0130	0.2584	-0.1195	0.0814	0.0215	0.4981
q62	0.3792	0.3329	0.0788	0.0258	-0.0799	-0.0735	0.5401
q61	0.3731	0.0422	0.2333	-0.1543	0.0524	0.1537	0.5723
q57	0.3434	0.1975	0.1397	-0.1035	0.0173	0.0580	0.6267
q55	0.3323	0.2253	0.1444	-0.0866	-0.1110	-0.1092	0.7157
q60	0.3138	0.1793	0.2863	-0.1408	-0.1115	0.1419	0.5830
q88	-0.0559	0.8416	-0.1698	0.1221	-0.1728	0.0207	0.4908
q82	-0.1086	0.8027	-0.0061	-0.1079	0.0481	0.1148	0.4671
q86	-0.0223	0.7907	-0.1841	0.1851	-0.2717	-0.0594	0.5157
q72	-0.1902	0.7307	0.0732	-0.0356	-0.0190	0.0636	0.6192
q87	-0.0412	0.7087	-0.1592	0.2033	-0.1740	-0.0938	0.5769
q83	-0.0268	0.6935	-0.0437	-0.0722	0.0365	0.1119	0.5533
q85	0.0465	0.6558	-0.1329	0.0946	-0.1210	-0.0631	0.6160
q84	0.1173	0.6334	-0.0012	-0.0617	0.1151	-0.0186	0.4110
q73	-0.0108	0.6215	-0.0072	-0.1404	0.2191	0.0681	0.4916
q76	-0.0506	0.5946	0.0989	-0.1722	0.0983	0.0796	0.5980
q78	0.0050	0.5853	0.1233	-0.0703	0.0433	0.0813	0.5342
q74	0.0480	0.5785	0.0598	-0.1700	0.0843	0.1578	0.5170
q65	0.0137	0.5626	-0.0520	0.3379	0.0203	-0.3722	0.3753
q77	-0.0114	0.5566	0.1200	-0.1661	0.1994	0.0585	0.5019
q66	-0.0026	0.5338	-0.0743	0.3891	0.0590	-0.3830	0.3536
q64	0.0946	0.4860	-0.0094	0.0860	-0.1153	-0.1995	0.6909
q63	0.2287	0.4722	0.0016	0.1722	-0.0712	-0.2221	0.5007
q59	0.2649	0.4558	0.0511	-0.0719	0.0381	-0.0263	0.5036
q80	-0.0884	0.3778	0.1694	-0.0718	0.1774	0.1062	0.6952
q40	0.2229	0.3411	-0.0557	0.2207	0.0547	-0.3007	0.5705
q23	-0.1743	-0.1807	0.9677	-0.1036	0.0580	-0.0050	0.3769

q22	-0.1211	-0.1218	0.9209	-0.1002	-0.0296	0.0293	0.4181
q25	-0.1262	-0.0387	0.8824	0.1192	-0.0679	-0.0327	0.3882
q21	-0.0993	0.0201	0.8548	0.1123	-0.0760	-0.0706	0.3916
q24	-0.0194	-0.1272	0.8341	0.0274	-0.1636	0.0426	0.4859
q19	-0.2332	0.0809	0.7821	0.2158	0.0217	-0.1268	0.4375
q20	-0.0078	-0.0199	0.7033	-0.0413	-0.0847	0.1094	0.5378
q26	0.1558	0.0416	0.5345	0.1875	-0.0703	-0.1160	0.5108
q18	-0.1668	0.2202	0.4853	0.2034	-0.0506	-0.1836	0.6903
q7	0.0006	-0.0642	0.4066	0.2020	-0.0175	-0.0825	0.7975
q3	-0.0708	0.0031	0.3579	0.2328	-0.0114	0.0245	0.7950
q30	-0.1215	0.2252	-0.0634	0.7614	0.0020	-0.0257	0.3584
q29	-0.0960	0.1811	0.0646	0.7058	-0.0068	-0.0988	0.4071
q13	0.0883	-0.0347	0.0886	0.6810	-0.0177	-0.0074	0.4658
q33	0.0119	0.1360	-0.1795	0.6773	-0.1183	0.2189	0.5369
q2	0.1084	0.0001	0.0461	0.6741	0.0249	-0.1081	0.4533
q1	-0.0061	0.0811	-0.0750	0.6315	0.0633	-0.1388	0.5587
q32	0.0592	0.1429	-0.2897	0.6199	-0.1295	0.1971	0.6237
q28	-0.0499	0.0527	0.1140	0.6188	0.0353	0.0415	0.5076
q34	0.0175	0.2055	-0.2842	0.6125	-0.2309	0.4663	0.5165
q11	0.1657	-0.2067	0.2177	0.5992	0.0465	0.1164	0.4083
q35	-0.0201	0.1377	-0.2088	0.5947	-0.1085	0.4466	0.5132
q31	0.1918	0.0259	-0.0256	0.5809	0.0665	0.0255	0.4850
q9	0.0277	-0.0909	0.1483	0.5677	0.0420	0.1521	0.5302
q12	0.0561	-0.0678	0.0099	0.5676	0.0723	0.1283	0.5900
q5	0.0794	-0.0328	0.1260	0.5336	0.0089	0.0329	0.6048
q14	0.0086	-0.0433	-0.0171	0.5221	0.1452	0.2134	0.5633
q15	0.0035	-0.0797	0.1680	0.5163	0.0147	0.2775	0.5197
q8	0.0317	0.0592	0.0035	0.5143	-0.0227	0.0747	0.6858
q10	0.1020	-0.1523	0.0336	0.4963	0.0737	0.1879	0.6377
q27	0.0021	-0.1103	0.0853	0.4547	0.0820	0.3338	0.5641
q4	-0.0121	-0.1177	0.2513	0.4503	0.0716	0.0992	0.6263
q70	0.0477	-0.1160	-0.1305	0.0299	0.7658	-0.0348	0.5492
q69	0.0490	-0.1172	-0.0119	-0.0719	0.7419	-0.0215	0.5551
q81	0.0627	-0.0786	-0.0931	0.1677	0.6187	0.0359	0.5489
q68	0.0803	0.0125	-0.1008	0.1160	0.4991	-0.0706	0.7115
q75	0.0247	0.2106	-0.0594	-0.0079	0.4177	0.0330	0.6969
q79	0.0028	-0.0101	-0.0514	0.3167	0.4084	0.0309	0.6367
q36	-0.1130	-0.0009	-0.0437	0.4147	-0.0074	0.5919	0.4967
q37	-0.0725	-0.0078	-0.0037	0.3700	0.0032	0.5901	0.4936
q16	-0.0977	-0.0429	0.1459	0.2623	0.1044	0.3654	0.6676

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqueness
q43	0.9236	-0.0830	0.0104	-0.1219	-0.0289	-0.0522	0.4010
q50	0.8834	-0.0529	0.0006	-0.0626	0.0322	-0.0163	0.3350
q47	0.8812	-0.0418	0.0075	-0.1347	-0.0037	-0.0199	0.4082
q45	0.8630	-0.0818	0.0561	-0.1381	-0.0394	0.1094	0.4197

q41	0.7499	-0.0621	0.0736	-0.0828	0.1067	-0.0136	0.4556
q49	0.7403	0.0429	-0.0446	0.0016	-0.0667	0.0427	0.4527
q46	0.6732	0.0104	-0.0356	0.0205	-0.0570	0.0048	0.5668
q48	0.6667	-0.0572	-0.1433	0.0046	0.0260	-0.0998	0.6715
q39	0.6554	0.0031	-0.0027	0.0700	0.0238	0.0842	0.4674
q38	0.6421	-0.0214	-0.0957	0.1240	0.0331	-0.0086	0.5381
q51	0.6125	-0.0119	-0.1169	0.0928	-0.0172	-0.0627	0.6353
q42	0.6052	0.0343	-0.0317	0.0530	-0.0306	-0.0571	0.5982
q53	0.5635	0.0136	0.0933	0.0398	0.1081	0.0177	0.4984
q44	0.5502	0.2576	0.0417	-0.0792	-0.0886	0.0465	0.4837
q58	0.4264	0.1137	-0.1240	0.2549	0.0814	-0.0472	0.5312
q82	-0.0999	0.8178	-0.0792	-0.0262	0.0140	0.1672	0.4599
q73	0.0003	0.7629	-0.0971	-0.0502	0.0694	0.0365	0.4710
q74	0.0269	0.7555	-0.1336	0.0038	-0.0065	-0.0167	0.4940
q76	-0.0648	0.7310	-0.1479	0.0460	0.0142	0.0448	0.5767
q77	-0.0074	0.7183	-0.1326	0.0658	0.0686	0.0206	0.4825
q72	-0.1484	0.7060	0.0140	0.0124	-0.0701	0.1734	0.6094
q78	0.0081	0.6773	-0.0241	0.0550	-0.0479	0.0538	0.5223
q83	-0.0180	0.6376	-0.0536	-0.0234	0.0589	0.1964	0.5591
q84	0.1165	0.6288	-0.0358	-0.0081	0.0477	0.1826	0.4099
q88	-0.0208	0.4828	0.1487	-0.1065	-0.0200	0.4760	0.4679
q59	0.2520	0.4378	-0.0606	0.0494	0.0160	0.1414	0.5163
q75	-0.0083	0.3650	0.0172	-0.0289	0.2955	-0.0289	0.6956
q30	-0.1221	-0.0640	0.8393	-0.0380	0.0721	0.2800	0.3408
q13	0.0547	-0.0306	0.7898	-0.0136	-0.1102	-0.0126	0.4374
q29	-0.1083	-0.0702	0.7874	0.0626	0.0368	0.2690	0.3878
q2	0.0877	-0.1231	0.7505	0.0068	-0.0223	0.1385	0.4626
q1	-0.0155	-0.0656	0.7165	-0.1125	0.0037	0.1670	0.5699
q33	-0.0211	-0.0360	0.7104	-0.1394	0.0290	0.0794	0.5784
q11	0.1396	-0.0488	0.6976	0.0899	-0.0709	-0.2110	0.3705
q12	0.0386	0.1030	0.6770	-0.1175	-0.1065	-0.2036	0.5295
q28	-0.0492	-0.1073	0.6731	0.1262	0.0912	0.1278	0.5004
q32	0.0072	-0.0534	0.6409	-0.2086	0.0281	0.1160	0.6654
q9	0.0002	-0.0445	0.6368	0.0890	0.0341	-0.0903	0.5311
q14	-0.0241	0.2063	0.6349	-0.1450	-0.0427	-0.2755	0.4913
q31	0.1610	-0.1191	0.6323	0.0135	0.1195	0.1233	0.4663
q15	-0.0360	0.1368	0.6054	0.0445	-0.0618	-0.2692	0.4827
q5	0.0613	-0.0400	0.6001	0.0592	-0.0226	-0.0031	0.6033
q10	0.0743	0.0365	0.5739	-0.0661	-0.0398	-0.2415	0.6051
q8	0.0030	-0.0022	0.5623	-0.0102	0.0006	0.0473	0.6875
q37	-0.0918	0.0720	0.3603	0.0662	0.1599	-0.2201	0.7026
q23	-0.1498	-0.0391	-0.1391	0.8964	0.1120	-0.1250	0.3587
q22	-0.0917	0.0057	-0.1401	0.8391	0.0378	-0.1165	0.4111
q25	-0.0806	-0.0311	0.1047	0.8064	-0.0047	0.0079	0.3727
q21	-0.0413	0.0096	0.1079	0.7660	-0.0398	0.0328	0.3809
q24	0.0050	-0.0791	-0.0105	0.7634	-0.0539	-0.0743	0.4790

q19	-0.1652	0.0324	0.2316	0.6959	0.0236	0.0952	0.4367
q20	0.0061	0.1319	-0.0556	0.6147	-0.0520	-0.1373	0.5362
q26	0.1785	-0.0785	0.1776	0.5187	0.0025	0.1446	0.4979
q18	-0.1099	0.1849	0.2486	0.3621	-0.1485	0.1108	0.7090
q7	0.0360	-0.0864	0.2044	0.3418	-0.0227	0.0336	0.8096
q69	-0.0118	0.0523	-0.0723	0.1150	0.6667	-0.0819	0.5027
q70	-0.0026	0.0269	0.0390	0.0015	0.6623	-0.0713	0.5100
q68	0.0498	0.0110	0.1096	0.0250	0.4571	0.0618	0.6876
q81	0.0402	0.0692	0.2078	-0.0090	0.4488	-0.1031	0.5867
q86	0.0159	0.3366	0.1967	-0.1041	-0.0834	0.5526	0.4802
q87	0.0056	0.3281	0.2278	-0.1137	-0.0611	0.4753	0.5604
q85	0.0803	0.2939	0.1088	-0.0562	0.0234	0.4582	0.5769
q63	0.2388	0.2755	0.1876	-0.0080	-0.0933	0.3157	0.5382
q64	0.1253	0.2569	0.0838	-0.0116	-0.0950	0.3143	0.7288

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqueness
q43	0.9133	-0.0922	-0.0743	-0.0943	0.0553	-0.0148	0.3983
q45	0.8902	-0.0430	0.1119	-0.1520	-0.0908	-0.0734	0.4198
q47	0.8799	-0.0388	-0.0402	-0.1208	0.0237	-0.0037	0.4028
q50	0.8688	-0.0422	-0.0222	-0.0444	-0.0092	0.0421	0.3351
q49	0.7414	0.0689	-0.0005	-0.0012	-0.0605	-0.0838	0.4549
q41	0.7369	-0.0471	0.0877	-0.0613	-0.0447	0.1008	0.4542
q46	0.6805	0.0093	-0.1149	0.0240	0.0676	-0.0537	0.5623
q39	0.6744	0.0417	0.1027	0.0579	-0.1389	-0.0039	0.4615
q48	0.6280	-0.0661	-0.1797	0.0419	0.0104	0.0456	0.6810
q38	0.6212	0.0111	-0.0393	0.1378	-0.0867	0.0217	0.5389
q42	0.5931	0.0190	-0.1488	0.0641	0.1101	0.0001	0.5962
q51	0.5898	-0.0139	-0.1768	0.1135	0.0385	-0.0001	0.6371
q44	0.5673	0.2450	-0.0318	-0.0864	0.1051	-0.0842	0.4840
q53	0.5507	0.0364	0.1272	0.0427	-0.0500	0.1038	0.5021
q82	-0.0605	0.8043	0.0345	-0.0773	0.0037	-0.0047	0.4537
q73	0.0029	0.7225	-0.0373	-0.0532	0.0594	0.0557	0.4689
q74	0.0010	0.7104	-0.0811	0.0289	0.0582	0.0016	0.4907
q76	-0.0680	0.6984	-0.0226	0.0474	-0.0184	-0.0039	0.5713
q77	-0.0140	0.6835	-0.0574	0.0693	0.0337	0.0534	0.4815
q72	-0.0894	0.6814	0.1083	-0.0298	0.0118	-0.0993	0.6150
q78	0.0055	0.6485	0.0015	0.0531	0.0762	-0.0443	0.5196
q83	0.0424	0.6303	0.0593	-0.0787	-0.0265	0.0269	0.5701
q84	0.1552	0.6285	0.0442	-0.0607	0.0081	0.0321	0.4207
q59	0.2673	0.4597	0.0614	0.0089	-0.0698	-0.0052	0.5213
q30	-0.0738	0.0405	1.0026	-0.0800	-0.1604	-0.0259	0.3021
q29	-0.0640	0.0365	0.9378	0.0182	-0.1493	-0.0528	0.3539
q28	-0.0392	-0.0285	0.7333	0.1142	-0.0657	0.0295	0.4788
q32	0.0231	-0.0104	0.7001	-0.1987	-0.0510	-0.0289	0.6397
q31	0.1690	-0.0495	0.6974	0.0136	-0.0756	0.0586	0.4439
q33	-0.0081	-0.0064	0.6616	-0.1273	0.0658	-0.0161	0.5732

q1	0.0164	-0.0032	0.6556	-0.1514	0.0783	-0.0348	0.5731
q2	0.1094	-0.0580	0.6485	-0.0244	0.1068	-0.0509	0.4676
q5	0.0438	-0.0063	0.4719	0.0712	0.1491	-0.0411	0.6014
q8	0.0119	0.0105	0.4233	-0.0076	0.1634	-0.0114	0.6880
q9	-0.0392	-0.0383	0.3875	0.1276	0.2814	0.0360	0.5353
q23	-0.1692	-0.0545	-0.1513	0.9408	-0.0324	0.1199	0.3504
q22	-0.1017	-0.0181	-0.1703	0.8774	-0.0019	0.0450	0.4068
q25	-0.0485	-0.0206	0.1170	0.8105	-0.0517	-0.0279	0.3758
q24	0.0052	-0.0837	-0.0429	0.8031	-0.0099	-0.0670	0.4667
q21	-0.0120	0.0261	0.1186	0.7611	-0.0422	-0.0542	0.3878
q19	-0.1345	0.0780	0.3223	0.6737	-0.1148	-0.0092	0.4449
q20	-0.0068	0.0922	-0.1733	0.6559	0.1165	-0.0288	0.5361
q26	0.2303	-0.0268	0.2557	0.4833	-0.1222	-0.0423	0.5158
q14	-0.0714	0.0920	-0.0611	-0.1000	0.8023	0.0772	0.4404
q12	0.0023	0.0189	0.0186	-0.0920	0.7425	0.0058	0.4763
q15	-0.0974	0.0514	0.0563	0.1129	0.6329	0.0163	0.4803
q10	0.0168	-0.0358	0.0490	-0.0042	0.5901	0.0369	0.5919
q11	0.0844	-0.0927	0.1796	0.1420	0.5676	-0.0059	0.3583
q13	0.0533	-0.0361	0.3924	-0.0222	0.4437	-0.0697	0.4311
q69	-0.0380	0.0304	-0.1330	0.1074	0.0462	0.7216	0.4747
q70	-0.0228	0.0018	-0.0583	-0.0086	0.0869	0.7213	0.4774
q81	0.0082	0.0491	0.1210	0.0101	0.0999	0.4726	0.5997
q68	0.0661	0.0277	0.2186	0.0096	-0.1282	0.4374	0.6931

Table b. MIES factors and item loading (Promax rotation)

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqueness
q43	0.9282	-0.0951	-0.0951	-0.1082	0.0726	-0.0178	0.3961
q45	0.9002	-0.0449	0.0941	-0.1583	-0.0789	-0.0732	0.4189
q47	0.8884	-0.0400	-0.0559	-0.1278	0.0390	-0.0095	0.4029
q50	0.8756	-0.0434	-0.0307	-0.0515	-0.0060	0.0443	0.3349
q49	0.7480	0.0684	-0.0062	-0.0108	-0.0582	-0.0799	0.4550
q41	0.7425	-0.0476	0.0768	-0.0657	-0.0381	0.1006	0.4541
q46	0.6792	0.0112	-0.1127	0.0258	0.0642	-0.0576	0.5630
q39	0.6715	0.0430	0.1076	0.0571	-0.1412	-0.0010	0.4612
q48	0.6299	-0.0647	-0.1795	0.0351	0.0162	0.0406	0.6818
q38	0.6117	0.0145	-0.0150	0.1457	-0.1190	0.0301	0.5364
q42	0.5944	0.0188	-0.1501	0.0595	0.1171	-0.0042	0.5958
q51	0.5832	-0.0113	-0.1626	0.1165	0.0296	-0.0029	0.6376
q44	0.5775	0.2432	-0.0497	-0.0955	0.1197	-0.0875	0.4824
q53	0.5529	0.0365	0.1221	0.0379	-0.0479	0.1084	0.5022
q82	-0.0663	0.8079	0.0392	-0.0713	-0.0085	-0.0050	0.4537
q73	0.0013	0.7259	-0.0406	-0.0541	0.0596	0.0520	0.4687
q74	-0.0114	0.7157	-0.0656	0.0401	0.0395	-0.0008	0.4898
q76	-0.0729	0.7028	-0.0134	0.0477	-0.0344	-0.0009	0.5714
q77	-0.0150	0.6862	-0.0560	0.0618	0.0342	0.0535	0.4827
q72	-0.0891	0.6845	0.0965	-0.0334	0.0238	-0.1019	0.6156

q78	-0.0037	0.6510	0.0108	0.0599	0.0679	-0.0447	0.5194
q83	0.0354	0.6336	0.0621	-0.0714	-0.0304	0.0229	0.5705
q84	0.1512	0.6307	0.0487	-0.0554	-0.0093	0.0370	0.4205
q59	0.2555	0.4637	0.0784	0.0220	-0.0958	-0.0003	0.5197
q30	-0.0841	0.0414	0.9695	-0.0589	-0.1202	-0.0294	0.3039
q29	-0.0781	0.0371	0.9127	0.0393	-0.1158	-0.0506	0.3553
q28	-0.0525	-0.0274	0.7145	0.1285	-0.0259	0.0233	0.4746
q31	0.1591	-0.0482	0.6762	0.0289	-0.0424	0.0523	0.4421
q32	0.0128	-0.0098	0.6727	-0.1735	-0.0166	-0.0406	0.6352
q33	-0.0159	-0.0069	0.6303	-0.1070	0.1104	-0.0318	0.5648
q1	0.0148	-0.0072	0.6272	-0.1341	0.1011	-0.0351	0.5733
q2	0.1045	-0.0613	0.6261	-0.0068	0.1238	-0.0466	0.4709
q5	0.0414	-0.0034	0.4529	0.0842	0.1557	-0.0425	0.6140
q8	0.0148	0.0114	0.4013	0.0044	0.1638	-0.0106	0.7027
q23	-0.1971	-0.0420	-0.0915	0.9347	-0.0464	0.1153	0.3500
q22	-0.1359	-0.0059	-0.1091	0.8838	-0.0213	0.0409	0.3943
q24	-0.0294	-0.0727	0.0101	0.8144	-0.0184	-0.0741	0.4508
q25	-0.0642	-0.0125	0.1440	0.7934	-0.0366	-0.0269	0.3883
q21	-0.0155	0.0314	0.1302	0.7269	-0.0126	-0.0499	0.4133
q20	-0.0180	0.0985	-0.1474	0.6422	0.1211	-0.0316	0.5383
q26	0.2166	-0.0220	0.2712	0.4801	-0.1144	-0.0379	0.5192
q14	-0.0540	0.0782	-0.0931	-0.0980	0.8151	0.0754	0.4456
q12	0.0172	0.0046	-0.0133	-0.0891	0.7592	0.0070	0.4786
q15	-0.0881	0.0445	0.0297	0.1116	0.6599	0.0079	0.4790
q10	0.0283	-0.0433	0.0189	-0.0043	0.6175	0.0274	0.5895
q11	0.0911	-0.0983	0.1558	0.1439	0.5873	-0.0094	0.3659
q69	-0.0443	0.0311	-0.1182	0.1063	0.0307	0.7257	0.4738
q70	-0.0201	-0.0004	-0.0612	-0.0152	0.0845	0.7253	0.4759
q81	0.0050	0.0483	0.1148	0.0127	0.1101	0.4693	0.5999
q68	0.0578	0.0292	0.2233	0.0157	-0.1311	0.4395	0.6925

Appendix 19. Synthesis method, search strategy and papers excluded at full-text stage for the meta-ethnography review

Getting started (stage 1)

There are different methods for qualitative evidence synthesis. I chose meta-ethnography as I hoped to develop conceptual understanding through a process of constant comparison of concepts and metaphors, rather than to simply aggregate findings. At the end of the process, I aimed to develop a “line of argument” to make “a whole into something more than the parts alone” using a storyline and conceptual model.

Deciding what is relevant (stage 2)

I conducted a systematic search using MEDLINE, Embase, Global Health, PsycINFO, Science Citation Index Expanded and Social Sciences Citation Index to identify relevant articles. I combined terms and phrases related to foundation doctors, interns, junior doctors, career choices (general terms, specialty choices, migration, rural, public or private sector etc.) and qualitative studies filters (229). I included papers published between 2000 and 2020 in English. The search strategy is provided in appendix 1.

I adopted a broad definition of career intention and decisions including but not limited to migration, public/private/dual practice preference, rural/urban preference, and general practice or specific specialty. To meet “foundation year or internship experience” criteria for inclusion, papers had to focus on how the experience during foundation years or internship impacted their career intention and decisions. I defined internship as the period after primary academic qualification and before official licensure where doctors work in accredited positions in hospital settings to gain supervised experience, in line with another review. I excluded papers relating to undergraduate medical education, clerkship and residency unless the papers explicitly stated that the focus is on the first year of residency which is commonly referred to as internship.

After de-duplication, I imported the citations into Abstrackr for the initial title and abstract screening. I reviewed all the titles and abstracts to assess eligibility for full-text review, and a random subset of 30% was reviewed by DM. The agreement rate on which study to include at this stage was high (percentage agreement 0.97 [excellent], Cohen’s Kappa 0.56 [moderate], Gwet’s AC1 0.97 [excellent]) thus we proceeded with the full-text review. All full texts were reviewed by me and DM independently and discussed for inclusion or exclusion. Additionally, all the included papers after the full-text stage were assessed using two methods of appraisal by myself and DM individually: (1) the Critical Appraisal Skills Programme (CASP), and (2) the global categorization, described by Dixon-Woods et al: “key paper” (conceptually rich and could potentially make an important contribution to the synthesis), “satisfactory paper”, “irrelevant” to the synthesis, and a methodologically “fatally flawed” (for example unclear study design and data source, or using a quantitative numeric and counting analytical approach to qualitative interviews data and unable for further synthesis). I excluded all “irrelevant” papers at full-text stage and “fatally flawed” papers at the quality appraisal stages, but did not exclude papers that were assessed low quality based on the CASP checklist unless they were assessed as fatally flawed. I resolved disagreements on inclusion at all stages by discussion among the two reviewers. Excel sheet

was used during the full-text screening and quality assessment phases where the reviewers note down their justification and other comments as a basis for discussion.

Reading the studies, determining how studies are related and translating the studies (stage 3, 4 and 5)

I first used NVivo software (version 1.4) to facilitate close reading and extraction and comparison of “concepts” from each selected paper. Contextual information of all included papers was first extracted and all papers were read thoroughly by two reviewers myself and DM. The concept of “first-order constructs” (participants’ “common-sense interpretation in their own words”) and “second-order constructs” (researchers’ interpretation based on first-order constructs) is usually distinguished for meta-ethnography and usually “second-order constructs” are “data” for meta-ethnography reviews (232,233). In our synthesis, as some studies did not primarily focus on linking internship experience and career outcomes but have relevant quotations and data establishing that link, I decided to extract both “first-order constructs” and “second-order constructs” and use both to develop “third-order constructs” (reviewers’ interpretation of original authors’ interpretation).

Four “key” papers were selected based on their richness and career outcomes examined, to be read and examined by me and DM independently to identify and extract concepts from each paper, and then they discussed the concepts and compared any differences in their interpretation. The rest of the papers were extracted by me only but reviewed by DM. Concepts from all included papers were then clustered into relevant categories through constant discussion and comparison between me and DM. For example, “competition between peers”, “gathering information from peers”, “norms among peers” and “support from peers” were merged into “relationship with peers” at this step.

I then went back to the primary papers, “translated” and compared our newly developed conceptual categories in all papers to ensure that no additional data were ignored. I read through all the papers again multiple times and wrote notes and selected quotes from each paper focusing on the finalised categories. This translation was conducted in Microsoft Word and reflected in the translation table (see appendix 3).

Synthesising translations and expressing the synthesis (stage 6 and 7)

After completing the stages above, I organised the categories into higher-level themes to generate a conceptual model to illustrate how the FY and internship experiences influenced medical doctors’ career intention/decisions. This is different from other types of qualitative synthesis that stop analysis at the stage where they have theoretically saturated categories. There are three ways to synthesize translation for meta-ethnography, i.e. refutational synthesis, reciprocal synthesis and line-of-argument.

I decided to go with the “line-of-argument” approach which refers to linking the themes and categories together and making “a whole into something more than the parts alone”, using a storyline and conceptual model. The model and the categories were shared and discussed within the research team for validation and feedback.

I also applied the GRADE-CERQual framework to define our confidence at the “category” level. GRADE-CERQual includes four domains (methodological limitations, relevance,

adequacy of data, coherence) and an overall rating of confidence (high, moderate, low, very low). The assessments were made by me and further discussed with DM.

Search strategy

Qualitative filter: The InterTASC Information Specialists' Sub-Group Search Filter Resource. available at www.york.ac.uk/inst/crd/intertasc/.

Database(s): Embase 1974 to present

Search Strategy:

#	Searches	Results
1	exp education, medical, graduate/	329433
2	Clinical Clerkship/	14197
3	(foundation adj2 doctor*).ti,ab.	738
4	"junior doctor".ti,ab.	5312
5	"house officer".ti,ab.	2304
6	(medical and (student* or trainee*)).ti,ab.	108992
7	(medical and (intern or interns or internship*)).ti,ab.	5938
8	"medical resident".ti,ab.	2512
9	"medical officer".ti,ab.	4041
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	398231
11	exp career choice/	399417
12	(career and (pathway or development or support or planning or framework or advice or choice or information or decision)).ti,ab.	22068
13	((specialty or specialism or speciality) and (choice or decision)).ti,ab.	6282
14	(migrat* or emigrat* or retention or recruit*).ti,ab.	1225052
15	(rural or remote or maldistribution or mal-distribution).ti,ab.	262192
16	("public sector" or "private sector" or "dual practice" or "dual job" or "moonlight").ti,ab.	18623
17	11 or 12 or 13 or 14 or 15 or 16	1885228
18	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide) adj3 (interview* or discussion* or questionnaire*)).ti,ab. or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant").tw,kw. or qualitative research/	489542
19	10 and 17 and 18	4732
20	limit 19 to (english language and yr="2000 - 2020")	4351

Qualitative filter used for Ovid Embase: Canadian Health Libraries Association

<https://extranet.santecom.qc.ca/wiki/biblio3s/doku.php?id=concepts:recherche-qualitative>

Database(s): Medline (Ovid MEDLINE® Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) 1946 to present

Search Strategy:

#	Searches	Results
1	exp education, medical, graduate/	73159
2	Clinical Clerkship/	5319
3	(foundation adj2 doctor*).ti,ab.	341
4	"junior doctor".ti,ab.	3202
5	"house officer".ti,ab.	1825
6	(medical and (student* or trainee*)).ti,ab.	77147
7	(medical and (intern or interns or internship*)).ti,ab.	3842
8	"medical resident".ti,ab.	1720
9	"medical officer".ti,ab.	3658
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	151559

11	exp career choice/	23931
12	(career and (pathway or development or support or planning or framework or advice or choice or information or decision)).ti,ab.	17168
13	((specialty or specialism or speciality) and (choice or decision)).ti,ab.	4283
14	(migrat* or emigrat* or retention or recruit*).ti,ab.	910858
15	(rural or remote or maldistribution or mal-distribution).ti,ab.	218779
16	("public sector" or "private sector" or "dual practice" or "dual job" or "moonlight*").ti,ab.	15580
17	11 or 12 or 13 or 14 or 15 or 16	1163766
18	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide) adj2 (interview* or discussion* or questionnaire*)) or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant")).tw,kw. or interviews as topic/ or focus groups/ or narration/ or qualitative research/	423340
19	10 and 17 and 18	2001
20	limit 19 to (english language and yr="2000 - 2020")	1754

Qualitative filter used for Ovid Medline: Canadian Health Libraries Association

<https://extranet.santecom.qc.ca/wiki/biblio3s/doku.php?id=concepts:recherche-qualitative>

Database(s): **Global Health** 1973 to 2021 Week 21

Search Strategy:

#	Searches	Results
1	(medical education or medical students).sh.	6731
2	clinical experience.sh.	107
3	(foundation adj2 doctor*).ti,ab.	12
4	"junior doctor*".ti,ab.	196
5	"house officer*".ti,ab.	119
6	(medical and (student* or trainee*)).ti,ab.	9742
7	(medical and (intern or interns or internship*)).ti,ab.	535
8	"medical resident*".ti,ab.	187
9	"medical officer*".ti,ab.	917
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	13520
11	career choice/	211
12	(career and (pathway or development or support or planning or framework or advice or choice or information or decision)).ti,ab.	1626
13	((specialty or specialism or speciality) and (choice or decision)).ti,ab.	301
14	(migrat* or emigrat* or retention or recruit*).ti,ab.	128402
15	(rural or remote or maldistribution or mal-distribution).ti,ab.	100789
16	("public sector" or "private sector" or "dual practice" or "dual job" or "moonlight*").ti,ab.	6671
17	11 or 12 or 13 or 14 or 15 or 16	229698
18	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide) adj3 (interview* or discussion* or questionnaire*).ti,ab. or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant").ti,ab,hw. or qualitative research/	97617
19	10 and 17 and 18	400
20	limit 19 to (english language and yr="2000 - 2020")	365

Qualitative filter used for Ovid Global Health: modified from Ovid Embase, changed "tw,kw." to "ti,ab,hw"

Database(s): PsycINFO 1806 to present

Search Strategy:

#	Searches	Results
1	exp Medical Education/ or exp Medical Students/	31001
2	exp Medical Internship/ or exp Medical Residency/	5111

3	(foundation adj2 doctor*).ti,ab.	52
4	"junior doctor".ti,ab.	438
5	"house officer".ti,ab.	304
6	(medical and (student* or trainee*)).ti,ab.	24791
7	(medical and (intern or interns or internship*)).ti,ab.	934
8	"medical resident".ti,ab.	547
9	"medical officer".ti,ab.	444
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	42708
11	exp Occupational Choice/	8975
12	(career and (pathway or development or support or planning or framework or advice or choice or information or decision)).ti,ab.	31145
13	((specialty or specialism or speciality) and (choice or decision)).ti,ab.	1091
14	(migrat* or emigrat* or retention or recruit*).ti,ab.	165607
15	(rural or remote or maldistribution or mal-distribution).ti,ab.	55763
16	("public sector" or "private sector" or "dual practice" or "dual job" or "moonlight").ti,ab.	8212
17	11 or 12 or 13 or 14 or 15 or 16	258048
18	((("semi-structured" or semistructured or unstructured or informal or "in-depth" or indepth or "face-to-face" or structured or guide or guides) adj3 (interview* or discussion* or questionnaire*)) or (focus group* or qualitative or ethnograph* or fieldwork or "field work" or "key informant")).ti,ab,id. or exp qualitative research/ or exp interviews/ or exp group discussion/ or qualitative study.md.) not "Literature Review".md.	412023
19	10 and 17 and 18	809
20	limit 19 to (english language and yr="2000 - 2020")	767

Qualitative filter used for Ovid PsycINFO: University of Texas

https://libguides.sph.uth.tmc.edu/search_filters/ovid_psycinfo_filters

Database: Web of Science - Science Citation Index Expanded (SCI-EXPANDED) --1900-present & Social Sciences Citation Index (SSCI) --1900-present

- (TS=("foundation doctor*" OR "junior doctor*" OR "house officer*" OR "medical student*" OR "medical trainee*" OR "medical intern" OR "medical interns" OR "medical internship" OR "medical internships" OR "medical resident*" OR "medical officer*")) AND LANGUAGE: (English)
- (TS=("career" OR "specialty" OR "specialism" OR "speciality" OR "migrat*" OR "emigrat*" OR "remote" OR "rural" OR "maldistribution" OR "mal-distribution" OR "public sector" OR "private sector" OR "dual practice" OR "dual job" OR "moonlight*")) AND LANGUAGE: (English)
- (TS = ("semi-structured" OR "semistructured" OR "unstructured" OR "informal" OR "in-depth" OR "indepth" OR "face-to-face" OR "structured" OR "guide" OR "guides")) AND LANGUAGE: (English)
- (TS = ("interview*" OR "discussion*" OR "questionnaire*" OR "focus group" OR "focus groups" OR "qualitative" OR "ethnograph*" OR "fieldwork" OR "field work" OR "key informant")) AND LANGUAGE: (English)

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# 5	455 (#4 AND #3 AND #2 AND #1) AND LANGUAGE: (English) Indexes=SCI-EXPANDED, SSCI Timespan=2000-2020			Edit	☐	☐
# 4	1,688,182 ((TS = ("interview" OR "discussion" OR "questionnaire" OR "focus group" OR "focus groups" OR "qualitative" OR "ethnograph" OR "fieldwork" OR "field work" OR "key informant"))) AND LANGUAGE: (English) Indexes=SCI-EXPANDED, SSCI Timespan=All years			Edit	☐	☐
# 3	824,819 ((TS = ("semi-structured" OR "semistructured" OR "unstructured" OR "informal" OR "in-depth" OR "indepth" OR "face-to-face" OR "structured" OR "guide" OR "guides"))) AND LANGUAGE: (English) Indexes=SCI-EXPANDED, SSCI Timespan=All years			Edit	☐	☐
# 2	1,125,023 ((TS=("career" OR "specialty" OR "specialism" OR "speciality" OR "migrat" OR "emigrat" OR "remote" OR "rural" OR "maldistribution" OR "mal-distribution" OR "public sector" OR "private sector" OR "dual practice" OR "dual job" OR "moonlight"))) AND LANGUAGE: (English) Indexes=SCI-EXPANDED, SSCI Timespan=All years			Edit	☐	☐
# 1	48,283 ((TS=("foundation doctor" OR "junior doctor" OR "house officer" OR "medical student" OR "medical trainee" OR "medical intern" OR "medical interns" OR "medical internship" OR "medical internships" OR "medical resident" OR "medical officer"))) AND LANGUAGE: (English) Indexes=SCI-EXPANDED, SSCI Timespan=All years			Edit	☐	☐
					☐ AND ☐ OR Combine	Select All Delete

Qualitative filter used for Ovid Global Health: modified from Canadian Health Libraries Association
 PubMed filter <https://extranet.santecom.qc.ca/wiki/!biblio3s/doku.php?id=concepts:recherche-qualitative>

Papers excluded at full-text stage

ID	title	journal	Reason for exclusion
1	'[It's] more than just medicine': The value and sustainability of mandatory, non-clinical, short-term rural placements in a Western Australian medical school	Medical teacher	not internship
2	'Doctors ready to be posted are jobless on the street...' the deployment process and shortage of doctors in Tanzania	Human resources for health	no clear link between internship experience and career decision
3	'If you can't make it, you're not tough enough to do medicine': a qualitative study of Sydney-based medical students' experiences of bullying and harassment in clinical settings	Bmc Medical Education	no clear link between internship experience and career decision
5	A decade of Australian Rural Clinical School graduates--where are they and why?	Rural and remote health	not internship
6	A framework for developing rural academic general practices: a qualitative case study in rural Victoria	Rural and remote health	no clear link between internship experience and career decision
7	A qualitative exploratory study: Using medical students' experiences to review the role of a rural clinical attachment in KwaZulu-Natal	South African Family Practice	not internship
8	A qualitative inquiry into the challenges of medical education for retention of general practitioners in rural and underserved areas of Iran	Journal of Preventive Medicine and Public Health	not internship
9	A Qualitative Investigation of the Experiences of Students and Preceptors Taking Part in Remote and Rural Community Experiential Placements During Early Medical Training	Journal of medical education and curricular development	not internship
10	A Qualitative Study Exploring the Determinants, Coping, and Effects of Stress in United Kingdom Trainee Doctors	Academic psychiatry : the journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry	no clear link between internship experience and career decision
11	A qualitative study of factors influencing under-represented medical students' Decision making about residency training programs	Journal of General Internal Medicine	abstract only
12	A qualitative study of medical students' attitudes to careers in general practice	Education for Primary Care	not internship
13	A qualitative study on factors that influence Turkish medical students'	North American Journal of Medical Sciences	not internship

	decisions to become family physicians after the health transformation Programme		
14	A required rural health module increases students' interest in rural health careers	Rural and Remote Health	not internship
15	A Surgeon Led Clinically Focused Anatomy Course Increases Student Selection of General Surgery As a Career	Journal of Surgical Education	not internship
17	A taste of rural Highlands and Islands general practice: evaluation of remote placements in GP specialty training	Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors	not internship
18	Academic career in medicine: requirements and conditions for successful advancement in Switzerland	BMC health services research	focus not on internship experience
19	An exploration of when urban background medical students become interested in rural practice	Rural and remote health	focus not on internship experience
20	Areas of distinction - A chance to try out an academic or leadership career during internal medicine residency training	Journal of General Internal Medicine	abstract only
22	Attracting diverse talent to academia: Perspectives of medical students and residents	Journal of Career Development	not internship
24	Attracting neurology's next generation: A qualitative study of specialty choice and perceptions	Neurology	no clear link between internship experience and career decision
25	Attrition from surgical residency training: Perspectives from those who left	American Journal of Surgery	not internship
26	Australian medical students' intentions in relation to practice location: their short- and long-term time frame	Australian Journal of Rural Health	short report only
27	Back in the day. What are surgeon bloggers saying about their careers?	Journal of Surgical Education	focus not on internship experience
28	Balancing Two Cultures: American Indian/Alaska Native Medical Students' Perceptions of Academic Medicine Careers	Journal of community health	not internship
29	Barriers and facilitating factors in the professional careers of international medical graduates	Medical education	no clear link between internship experience and career decision
30	Barriers facing junior doctors in rural practice	Rural and remote health	no clear link between internship

			experience and career decision
32	Becoming a GP: a qualitative study of the career interests of medical students	Australian family physician	no clear link between internship experience and career decision
33	Becoming an academic doctor: perceptions of scholarly careers	Medical education	no clear link between internship experience and career decision
34	Being the 'med reg': An exploration of junior doctors' perceptions of the medical registrar role	Journal of the Royal College of Physicians of Edinburgh	no clear link between internship experience and career decision
35	Beyond recruitment: A model program for strengthening retention of under-represented minority pediatric trainees in academia	Academic Pediatrics	abstract only
36	Building a local medical workforce in Tasmania: where are international fee-paying medical graduates likely to work?	Rural and remote health	not internship
37	Building health system capacity through medical education: A targeted needs assessment to guide development of a structured internal medicine curriculum for medical interns in Botswana	Annals of Global Health	no clear link between internship experience and career decision
38	Can a family medicine rotation improve medical students' knowledge, skills and attitude towards primary care in Vietnam? a pre-test - post-test comparison and qualitative survey	Tropical Medicine and International Health	not internship
39	Can i cut it? Medical students' perceptions of surgeons and surgical careers	American Journal of Surgery	not internship
40	Career choices and what influences Nepali medical students and young doctors: a cross-sectional study	Human Resources for Health	not internship
41	Career choices: Recent trends in health professions education among doctors	Pakistan Journal of Medical and Health Sciences	no clear link between internship experience and career decision
42	Career decision making in undergraduate medical education	Canadian medical education journal	not internship
43	Career destination and reason for career destination preferences among medical graduates from Christian Medical College Vellore - does rural service obligation increase retention of medical graduates in rural service?	Journal of Family Medicine and Primary Care	survey

44	Change of place, change of pace, change of status: rural community training for junior doctors, does it influence choices of training and career?	Rural and Remote Health	not internship
45	Choosing a career in medicine: The motivations of medical students from the University of Cape Town	Education for Primary Care	not internship
46	Choosing child and adolescent psychiatry: Factors influencing medical students	Journal of the Canadian Academy of Child and Adolescent Psychiatry	Not clear connection with internship experience and career decision
47	Choosing family medicine - What influences medical students?	Canadian Family Physician	no clear link between internship experience and career decision
48	Community-based education: The influence of role modeling on career choice and practice location	Medical teacher	survey
49	Determinants of first practice location: Among Manitoba medical graduates	Canadian Family Physician	survey
50	Doctors becoming GPs: GP registrars' experience of medical training and motivations for going into general practice	Education for Primary Care	focus not on internship experience
51	Doctors on the move: A qualitative study on the driving factors in a group of Egyptian physicians migrating to Germany	Globalization and Health	focus not on internship experience
53	Effects of compulsory rural vocational training for Australian general practitioners: A qualitative study	Australian Health Review	not internship
54	Emergency medicine as a career choice: What influences medical students throughout their schooling?	Canadian Journal of Emergency Medicine	abstract only
55	Encouragers and discouragers affecting medical graduates' choice of regional and rural practice locations	Rural and Remote Health	not internship
56	Enhancing the choice of general practice as a career	Australian Family Physician	focus not on internship experience
58	Evaluating the rural health placements of the Rural Support Network at the Faculty of Health Sciences, University of Cape Town	South African Family Practice	not internship
59	Examining intention among future physicians to practice in high need health professional shortage areas in Tennessee	Dissertation Abstracts International: Section B: The Sciences and Engineering	survey
60	Examining Medical Student Specialty Choice Through a Gender Lens: An Orientational Qualitative Study	Teaching and learning in medicine	not internship
61	Exploring Residents' Experience of Career Development Scholarship Tracks: A	Teaching and learning in medicine	not internship

	Qualitative Case Study Using Social Cognitive Career Theory		
62	Exploring the career maze: An investigation of career intentions of medical graduates in Pakistan: A qualitative study	Pakistan Journal of Medical Sciences	focus not on internship experience
63	Extending a Conceptual Framework for Junior Doctors' Career Decision Making and Rural Careers: Explorers versus Planners and Finding the 'Right Fit'	International journal of environmental research and public health	focus not on internship experience
64	Factors affecting career preferences of medical students at the College of Medicine, Malawi	South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde	not internship
65	Factors affecting medical students' interests in working in rural areas in North India-A qualitative inquiry	PloS one	focus not on internship experience
67	Factors affecting the rural retention of medical graduates in lower northern Thailand	Journal of the Medical Association of Thailand	no clear link between internship experience and career decision
68	Factors Associated With Osteopathic Primary Care Residency Choice Decisions	The Journal of the American Osteopathic Association	not internship
69	Factors behind job preferences of Peruvian medical, nursing and midwifery students: a qualitative study focused on rural deployment	Human Resources for Health	not internship
70	Factors considered by medical students when formulating their specialty preferences in Japan: findings from a qualitative study	BMC medical education	not internship
71	Factors impacting the solo remote placement experiences of undergraduate James Cook University medical students: A mixed-methods pilot study	The Australian journal of rural health	focus not on internship experience
72	Factors Influencing Medical Students' Choice For Family Medicine As A Specialty In Pakistan	Journal of Ayub Medical College, Abbottabad : JAMC	no clear link between internship experience and career decision
73	Factors influencing recruitment and retention of foundation doctors in geographically unpopular locations	Future hospital journal	focus not on internship experience
74	Factors influencing the choice of anesthesia as a career in a developing country	Middle East Journal of Anesthesiology	survey
75	Factors influencing trainee doctor emigration in a high income country: a mixed methods study	Human resources for health	focus not on internship experience
76	Factors that influence a career choice in primary care: A mixed-methods study among medical students starting the social service program in Honduras	Dissertation Abstracts International: Section B: The Sciences and Engineering	focus not on internship experience

77	Factors that influence radiographers' decisions to pursue postgraduate education: An exploratory qualitative study	Journal of Medical Imaging and Radiation Sciences	population not doctor
78	Family medicine as a career option: How students' attitudes changed during medical school	Canadian Family Physician	survey
80	Foundation year one trainees feel simulation training will enhance learning of acute medicine, and development of early confidence in acute training may impact upon long term career choice	Medical Education, Supplement	abstract only
81	Gender and surgical careers: How can we better support women in surgery?	Medical Education, Supplement	abstract only
82	GP recruitment and retention: a qualitative analysis of doctors' comments about training for and working in general practice	Occasional paper (Royal College of General Practitioners)	survey
85	Identifying characteristics that students, interns and residents look for in their role models	Medical education	survey
86	Identifying motivations and personality of rural doctors: A study in Nusa Tenggara Timur, Indonesia	Education for health (Abingdon, England)	no clear link between internship experience and career decision
87	Identifying the motivators to engage african american students into careers in public health	Dissertation Abstracts International: Section B: The Sciences and Engineering	population not doctor
90	Influences on students' career decisions concerning general practice: A focus group study	British Journal of General Practice	not internship
91	Institutional conditions and individual experiences in the career-entry period of Swiss medical residents - A qualitative study	Swiss Medical Weekly	survey
92	Intellectual stimulation in family medicine: An international qualitative study of student perceptions	BJGP Open	not internship
93	Investigating a rural rotation in the Mississippi Delta utilising reflective writings: A qualitative study	Dissertation Abstracts International Section A: Humanities and Social Sciences	not internship
94	Job satisfaction of rural medical interns: A qualitative study	The Australian journal of rural health	no clear link between internship experience and career decision
96	Junior doctors' views of how their undergraduate clinical electives in palliative care influenced their current practice of medicine	Academic medicine : journal of the Association of American Medical Colleges	focus not on internship experience

97	Longitudinal Integrated Foundation Training: uplifting perspectives	Medical education	abstract only
99	Medical brain drain in Uganda: Causes and potential remedies	Annals of Global Health	abstract only
100	Medical migration: A qualitative exploration of the atypical path of Japanese international medical graduates	Medical teacher	focus not on internship experience
101	Medical student and psychiatrist perceptions towards a psychiatric career	Mental Health Review Journal	population not doctor
102	Medical Student Decision Making Regarding Pursuit of a Public Health Degree	Family medicine	not internship
103	Medical student experiences in prison health services and social cognitive career choice: a qualitative study	BMC medical education	not internship
104	Medical student observations on a career in psychiatry	Australian and New Zealand Journal of Psychiatry	survey
105	Medical student's perceptions of a career in gastroenterology: A peer led study	Gut	abstract only
106	Medical students and rural general practitioners: congruent views on the reality of recruitment into rural medicine	Australian Journal of Rural Health	not internship
107	Medical students on long-term rural clinical placements and their perceptions of urban and rural internships: a qualitative study	BMC medical education	not internship
108	Medical students' attitudes towards careers in primary care in Singapore	BMC medical education	not internship
109	Medical students' perceptions of general practice as a career; a phenomenological study using socialisation theory	Education for primary care : an official publication of the Association of Course Organisers, National Association of GP Tutors, World Organisation of Family Doctors	not internship
110	Medical students' perceptions of primary care: The influence of tutors, peers and the curriculum	Education for Primary Care	not internship
112	Overseas-trained doctors in Australia: Community integration and their intention to stay in a rural community	Australian Journal of Rural Health	no clear link between internship experience and career decision
113	Perceptions of graduates from Africa's first emergency medicine training program at the University of Cape Town/Stellenbosch University	CJEM	no clear link between internship experience and career decision
114	Perceptions of Malaysian medical students from different academic years on primary care: a qualitative research	Family medicine and community health	not internship

115	Postgraduate career intentions of medical students and recent graduates in Malawi: a qualitative interview study	BMC medical education	not internship
116	Postgraduates' perceptions of preparedness for work as a doctor and making future career decisions: support for rural, non-traditional medical schools	Education for health (Abingdon, England)	no clear link between internship experience and career decision
117	Pre-registration house officers' comments on working in the NHS: a qualitative study of the views of UK medical graduates of 1999	Medical teacher	survey
119	Preferences of doctors for working in rural Islamabad Capital Territory, Pakistan: a qualitative study	Journal of Ayub Medical College	not internship
120	Prevocational Integrated Extended Rural Clinical Experience (PIERCE): cutting through the barriers to prevocational rural medical education	Rural and remote health	not internship
121	Pursing a career in academic surgery among African American medical students	American journal of surgery	no clear link between internship experience and career decision
122	Push and stay factors affecting Irish medical student migration intentions	Irish journal of medical science	survey
123	Qualitative study of medical students' experiences of a psychiatric attachment	Psychiatrist	not internship
124	Raising concerns in the current NHS climate: a qualitative study exploring junior doctors' attitudes to training and teaching	Future healthcare journal	no clear link between internship experience and career decision
126	Review of final-year medical students' rural attachment at district hospitals in KwaZulu-Natal: Student perspectives	South African Family Practice	survey
127	Role models play the greatest role - a qualitative study on reasons for choosing postgraduate training at a university hospital	GMS Zeitschrift für medizinische Ausbildung	no clear link between internship experience and career decision
128	Rural exposure during medical education and student preference for future practice location - a case of Botswana	African Journal of Primary Health Care and Family Medicine	not internship
130	Rural rotations for interns: a demonstration programme in South Australia	The Australian journal of rural health	no clear link between internship experience and career decision
132	Southeast and East Asian American medical students' perceptions of careers in academic medicine	Journal of Career Development	no clear link between internship

			experience and career decision
134	Specialization training in Malawi: a qualitative study on the perspectives of medical students graduating from the University of Malawi College of Medicine	BMC medical education	not internship
135	Specialty income and career decision making: a qualitative study of medical student perceptions	Medical education	not internship
136	Specialty preferences of 1(st) year medical students in a Saudi Medical School - Factors affecting these choices and the influence of gender	Avicenna journal of medicine	survey
137	Stability and Change in the Journeys of Medical Trainees: A 9-Year, Longitudinal Qualitative Study	Academic medicine : journal of the Association of American Medical Colleges	no clear link between internship experience and career decision
138	Stick or twist? Career decision-making during contractual uncertainty for NHS junior doctors	BMJ open	no clear link between internship experience and career decision
139	Stories from early-career women physicians who have left academic medicine: A qualitative study at a single institution	Academic Medicine	no clear link between internship experience and career decision
140	Students' perspectives on the fourth year of medical school: A mixed-methods analysis	Academic Medicine	not internship
141	Support for rural practice: female physicians and the life-career interface	Rural and remote health	no clear link between internship experience and career decision
142	Taking a break: doctors opt out of training after foundation year 2	BMJ (Online)	short report only
143	The career aspirations and location intentions of James Cook University's first cohort of medical students: a longitudinal study at course entry and graduation	Rural and remote health	survey
145	The hidden curriculum of the medical care for elderly patients in medical education: a qualitative study	Gerontology & geriatrics education	not internship
147	The impact of interest: How do family medicine interest groups influence medical students?	Canadian Family Physician	no clear link between internship experience and career decision
148	The impact of the internal medicine sub-internship on medical student career choice	Journal of General Internal Medicine	not internship

149	The Influence of Academic Discourses on Medical Students' Identification With the Discipline of Family Medicine	Academic Medicine	no clear link between internship experience and career decision
150	The learner's perspective in GP teaching practices with multi-level learners: a qualitative study	BMC medical education	no clear link between internship experience and career decision
151	The lived experience of stress in British South-Asian medical students and junior doctors	Work (Reading, Mass.)	no clear link between internship experience and career decision
153	The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice	Medical education	no clear link between internship experience and career decision
154	The perceived usefulness of community based education and service (COBES) regarding students' rural workplace choices	Bmc Medical Education	not internship
155	The role of gender in the decision to pursue a surgical career: A qualitative, interview-based study	Canadian medical education journal	no clear link between internship experience and career decision
157	Trainee attrition in obstetrics and gynaecology training - A qualitative analysis of trainee attitudes	BJOG: An International Journal of Obstetrics and Gynaecology	abstract only
158	UK medical students' attitudes towards their future careers and general practice: a cross-sectional survey and qualitative analysis of an Oxford cohort	BMC medical education	survey
159	Understanding rural clinical learning spaces: Being and becoming a doctor	Medical teacher	no clear link between internship experience and career decision
160	Understanding the 'four directions of travel': qualitative research into the factors affecting recruitment and retention of doctors in rural Vietnam	Human Resources for Health	no clear link between internship experience and career decision
162	Views of UK doctors in training on the timing of choosing a clinical specialty: Quantitative and qualitative analysis of surveys 3 years after graduation	Postgraduate Medical Journal	survey
163	What are the barriers faced by under-represented minorities applying to dermatology? A qualitative cross-	Journal of the American Academy of Dermatology	no clear link between internship

	sectional study of applicants applying to a large dermatology residency program		experience and career decision
164	What do doctors want? Incentives to increase rural recruitment and retention in India	BMC Proceedings	abstract only
165	What do medical students think about primary care in Malaysia? A qualitative study	Education for Primary Care	population include medical student
166	What factors in rural and remote extended clinical placements may contribute to preparedness for practice from the perspective of students and clinicians?	Medical teacher	no clear link between internship experience and career decision
168	What leads to the subjective perception of a 'rural area'? A qualitative study with undergraduate students and postgraduate trainees in Germany to tailor strategies against physician's shortage	Rural and remote health	no clear link between internship experience and career decision
169	What makes a medical student avoid or enter a career in urology? Results of an international survey	The Journal of urology	survey
171	Where are they working? a case study of twenty Cuban-trained South African doctors	African Journal of Primary Health Care and Family Medicine	no clear link between internship experience and career decision
174	Why are you draining your brain? Factors underlying decisions of graduating Lebanese medical students to migrate	Social Science & Medicine	no clear link between internship experience and career decision
175	Why choose psychiatry? Report on a qualitative workshop	The Psychiatrist	abstract only
177	Why do Danish junior doctors choose general practice as their future specialty? Results of a mixed-methods survey	European Journal of General Practice	survey
178	Why do doctors in Norway choose general practice and remain there? A qualitative study about motivational experiences	Scandinavian journal of primary health care	no clear link between internship experience and career decision
179	Why do junior doctors not want to work in a rural location, and what would induce them to do so?	The Australian journal of rural health	survey
181	Why doctors choose small towns: A developmental model of rural physician recruitment and retention	Social Science and Medicine	no clear link between internship experience and career decision
182	Why geriatrics? Academic geriatricians' perceptions of the positive, attractive aspects of geriatrics	Family Medicine	no clear link between internship

			experience and career decision
183	Why UK medical students change career preferences: an interview study	Perspectives on Medical Education	not internship
184	Why would I choose a career in family medicine?: Reflections of medical students at 3 universities	Canadian family physician Medecin de famille canadien	no clear link between internship experience and career decision
185	Women paediatricians: What made them choose their career?	Journal of Health, Organisation and Management	no clear link between internship experience and career decision
186	Women physicians: choosing a career in academic medicine	Academic medicine : journal of the Association of American Medical Colleges	no clear link between internship experience and career decision
187	Young surgeons' challenges at the start of their clinical residency: a semi-qualitative study	Innovative surgical sciences	no clear link between internship experience and career decision

Appendix 20. CASP and quality appraisal for meta-ethnography review

Author	Q1 Clear statement of aim	Q2 Method appropriate	Q3 Design appropriate	Q4 Recruitment strategy	Q5 Data collection	Q6 Relationship	Q7 Ethics	Q8 Data analysis	Q9 Finding clear	Q10 Valuable	Total score	Recommendation
Alberti 2017	2	2	2	1	2	0	2	1	2	2	16	satisfactory
Appleton 2017	2	2	2	2	2	2	2	2	2	2	20	key
Beattie 2017	2	2	2	2	2	2	2	2	2	2	20	satisfactory
Brodribb 2016	2	2	2	2	2	0	2	2	2	2	18	satisfactory
Croghan 2020	2	2	2	2	2	1	1	1	1	2	16	satisfactory
Cuesta-Briand 2020	2	2	2	2	2	0	1	2	2	2	17	key
Cutajar 2020	2	1	1	2	1	2	0	0	1	1	11	methodology fatally flawed
Elliott 2007	2	1	1	2	2	1	2	0	1	1	13	methodology fatally flawed
Essa 2010	2	2	2	1	2	0	2	2	2	2	17	key
Firth 2011	2	2	1	2	2	0	2	2	2	1	16	satisfactory
Harris 2020	2	2	2	2	2	1	2	2	2	2	19	key
Liang 2019	1	2	2	2	2	2	2	2	2	2	19	satisfactory
Ludwig 2018	1	2	2	2	2	1	1	2	2	1	16	satisfactory
Merrett 2017	2	2	1	2	2	0	2	1	2	2	16	satisfactory
Olsson 2019	2	2	2	1	2	0	2	2	2	2	17	key
Parker 2014	2	2	2	2	2	2	2	2	2	2	20	key
Querido 2018	2	2	2	2	2	2	2	2	2	2	20	satisfactory
Rizan 2019	2	2	2	2	2	0	2	2	2	2	18	key
Scanlan 2018	2	2	2	2	2	2	2	2	2	2	20	key
Sen Gupta 2008	1	1	1	1	1	0	1	0	1	1	8	methodology fatally flawed
Smith 2018	2	2	2	2	2	2	2	2	2	2	20	key
Spooner 2017	2	2	2	2	2	0	2	2	2	2	18	key
Sreedaran 2018	2	2	2	1	1	2	2	2	1	1	16	satisfactory
Van Hamel 2020	2	2	2	2	2	2	2	2	2	2	20	key
Williams 2000	2	2	2	1	2	2	0	2	2	2	17	key
Woodward 2018	2	1	1	2	2	0	2	1	2	1	14	satisfactory

1. Finding which career option is “more me” – hands on experience, comparing between rotations and deciding on the best fit, both clinically and in general

Reference	The “hand-on” experience and “real life” exposure	Positive experience, confidence and readiness	The workload, work-life balance, lifestyle	Well-being, emotional stress and the need to step off	Image of professions and self-identity
Williams 2000 UK / PRHO / Specialty choice – surgery CASP 17 (recruitment, ethics) / Key	- The amount of ward work often made it difficult for female PRHOs to get to theatre, however when they did manage to get to theatre they find the actual experience very enjoyable. <i>“I sutured an appendicectomy last night, and it was terribly exciting and I love suturing. It was wonderful, and I loved giving this person a lovely scar. (PRHO 8)”</i>		- Working hours of surgeons being incompatible with hours bringing up a family <i>“I like surgery but I know I definitely want a family, and I think to go into surgery it would mean delaying that for quite a while, and I don't know if I really want to. I mean, when you see the hours the consultants put in you just think, ‘Oh no, I just don't want to do that’. (PRHO 15)”</i> <i>“I would like to stay in hospital surgery, but I'm a bit family oriented so I'm not sure... I want to have the nice house, 2-4 children, and be happily married and all that, and I'm not sure how that works when you're a female surgeon...(PRHO 12)”</i>		- There are desirable characteristics of potential surgeons including “push” and determination, surgery as “doing” rather than “thinking”, taking a narrow view of patients rather than holistically <i>“Now I'm suddenly looking after someone's husband, someone's daughter, and it's quite stressful, because you don't want anything to happen to them because the same thing could happen to anyone in your family. So I don't know, that's not a very surgical opinion, that's a very medical thing to say, but I think it's important. I think it's sad that people think that it doesn't matter, the patient's just there but I do like to think about them, you do worry. (PRHO 12)”</i>
Scanlan 2018 UK / FY2 / General CASP 20 / Key	- Direct experience and comparison with other rotations making interns realize what “fit” in terms of personality and what they enjoy. <i>“Having the opportunity to do intensive care and anaesthetics as my first FY2 job which... because I was interested in it and I was given that by the programme director; he organised that, so I had experience in that before I applied, which I was very grateful for. having done that I knew that was what I wanted to do and so I applied. (Story 2 Steven)”</i> <i>“Anaesthetics is interesting but I didn’t think I want to do it. Didn’t get an A and E job but I got an intensive care job and then, I think, as I met the people with the emergency medicine doctors; I learned a bit more about how I liked to work...I think people talk about personalities and I thought maybe my personality wasn’t actually quite aligned to emergency medicine but I really enjoyed anaesthetics. (Story 2 Steven)”</i>	- Feeling confident after rotations on managing patients. <i>“I felt much more confident, at the end of the four months, that I could assess, you know, intensive care patients and make basic decisions. Nothing fancy but at least hold the fort for like an hour or so. (Story 2 Steven)”</i>	- Hoping to be able to control working hours <i>“Erm I think now, the longer I work for, not having any control over my annual leave, my days off, my time off, is really starting to really annoy me. So my next rota, for example, I have just been informed, you have three weeks’ annual leave, this is when they are, you can’t swap them, you can’t move them, tough. I think that that is a disgrace. the number of hours I have worked to be told, you’re not allowed to go on a family holiday that you’ve booked. You’re not allowed... I’ve been told I’m not allowed to go to a funeral before. I’ve been told I’m not allowed time off when I’m ill. That... I would have said, is the worst thing. I just, I don’t think it’s fair, and I think that bothers me more and more, I think, as time goes on. (Story 5 Clare)”</i>	- Feeling overwhelmed and exhausted in certain rotations <i>“sometimes a bit overwhelming and exhausting... You’ve literally been at work, slept, and been at work for seven days; you’ve had no social interaction at all outside of work, and that also gets you down. Because, you know, you need to do, you see friends and do fun things that will let you relax, to be able to maintain a, kind of, healthy emotional state. (Story 4 Gemma)”</i>	
Alberti 2017 UK / GPSpR / Specialty choice – GP CASP 16 (recruitment, relationship, analysis) / Satisfactory	- Previous exposure to GP as FD positively influenced selecting GP as a career. <i>“I think everyone should do a foundation rotation in GP, everybody. I think it will help not only people decide if they like it and what to do. But also having consultants understand what GPs actually do.”</i>				- Badmouthing of GP on social media, television and in newspaper, the general public’s lack of awareness what GP entails <i>“Also everything in the press, not just now but over the last however many years, there is a lot in the press about GP’s and missing this missing that and misrepresentation and I think that as well does impact on people’s perception”</i>
Merrett 2017 UK / FY1 / Specialty choice – GP CASP 16 (design, relationship, analysis) / Satisfactory	- More compelling and administrative issues in hospital clinicians when compared with GPs <i>“I just can’t imagine myself running after secretaries and stuff for the rest of my life. I think it’s just the whole sort of packet, rules and regulations within hospitals, you can’t do certain things without certain people’s signatures, and you can’t do this without that.’ (Participant, group 1)”</i> - Reluctance towards managing patients with mental health problems in GP, those perceived to be social rather than medical needs. Concern that might lose specific skill set <i>“Every single patient that came in wasn’t really with a medical condition. It was more psychosocial, and so I can understand why a lot of my friends were, like: “I would never do this. Why have I spent 5 years learning all about the body, the anatomy, everything, and it’s my</i>		- Perceived quality of life being better in GP. However, the actual experience also makes interns realize GP is as stressful and work long hours as others <i>“When I was working at [sic] GP, they actually worked really long hours, and the lifestyle didn’t seem that much better.’ (Participant, group 2)”</i>	- GPs being considered as a “lonely” specialty without support and team spirits <i>“It’s a lot scarier, because you’re more on your own for a long time. Yeah, you might work in a general practice with other GPs, but you could just be working as a GP on your own, on an island somewhere, no one else to speak to, and that’s quite scary.’ (Participant, group 4)”</i> - GPs increased litigation thus increased work stress and likelihood of burning out <i>“Yeah. I’ve come across GPs that are going through, like, litigation processes, and have been absolutely burnt out with it. I think everyone at some point, whatever specialty, will miss a diagnosis. But you’re much more open to litigation in general practice.’ (Participant, group 3)”</i>	- Medical and patients’ perception and stigma of GP

	psychiatrist or psychologist role used?” (Participant, group 5)” - Concern about GPs as running a business rather than practicing medicine “If you were seeing patients all day, fine. But it’s the extra time — the 4 hours lunchtime that you’re not having lunch ... it’s the other bits and pieces you’ve got, relating to QOF [Quality and Outcomes Framework] points, relating to managerial work, because general practice partners are also business people, really. It’s all that, and that’s not medicine.’ (Participant, group 3)”				
Smith 2018 UK / FY1 / Migration CASP 20 / Key	- F2 think the e-portfolio was cumbersome and too vague to be useful, and want to step off for a while, “If I can just not have to deal with any portfolio for two years I will be delighted. I think it just detracts so much from any enjoyment that you have... especially with the foundation e-portfolio because they have to design it so generically that some things that they want you to do can be incredibly difficult depending on the particular combination of jobs that you have. (P17)”	- Not feeling skills had adequately prepared them to enter specialty training directly. “When I see people go and start their CMT [core medical training], they cover CCU [the coronary care unit] and renal on their nightshift. It's funny because at the moment I'm the one calling them about this abnormal ECG [electrocardiogram], but then you think, God, in four months’ time I'm the one who is getting called... that sounds awful. I think maybe I am just not quite ready to go into CMT yet. (P9)”	- F2s have to stay late at work for jobs that are non-handoverable and get very busy “It’s things like ordering bloods for tomorrow. Things you know that should have been done during the day. But sometimes, you’re just so busy, it doesn’t get done. (P10)” - Poor work-life balance in the NHS and an expectation that there would be less work-life conflict abroad “I've spoken to people who are doing A&E there [in New Zealand], and it's very similar, but, less hours. So, they normally do four days a week, whereas, right now, I'm doing seven. I'm on seven days right now, and I'm working from either two or three, 'till midnight, every day. Next week, I'm going straight into nights. So that's two weeks that I cannot have any social life. In New Zealand, I can do the job for four days a week, and then have a nice weekend off. (P4)” “She [another doctor] says the quality of life out there [in Australia] is so much better. She said when she worked here she was always stressed out, quite anxious as well... Then when she went out there she felt more supported and had enough time off to relax. She feels like she’s absolutely a completely different person because her work life now doesn’t affect her personal life. (P9)”	- F2 feel like there were on a “conveyor belt” or “treadmill” of training and need to step off for a while or needing a break from medical training, from being a doctor, thinking about career progression, and hopefully could be more enthusiastic about work again. “You are on this conveyor belt, you're 17 and then you've signed up for life. I think, for me, it was just the last couple of years, you realise what you've actually committed to. If I commit to a training programme, that's six years or so and after that you are looking at trying to get consultancy posts quite quickly. I would think on that kind of timescale you are thinking about family and mortgages... I don't think you can really travel. This is an opportunity to go away for so long whilst still maintaining your clinical practice. (P6)” “It seems that a lot of FY2’s that I know are quite burnt out, to be honest. People are tired of, I don’t know if it’s tired of working, but... you get into medical school and then it’s five or six years and straight into foundation training and then you’re probably working towards entering medical school for many, many years before you enter medical school. So everyone just seems to need time off. (P12)” “t’s also a break from having to think about your career too much, especially if you want to go into a competitive speciality. There can always be a pressure on you that it’s not just enough to do the day job -you have to get published, you have to do your audits, your posters, your presentations, there’s extra courses and working everything into your CV and just all that general stuff, whereas I think if you practice medicine abroad...well, I certainly don’t intend on pushing the seriously academic side of my CV too much when I just want to enjoy doing the job. (P17)” “I feel like I should have a break for a year and probably that will make me feel more enthusiastic about working in the NHS again afterwards. (P1)”	
Spooner 2017 UK / FY2 / Specialty choice CASP 18 (relationship) / Key	- Observing and assisting as medical student is significantly different to the experience of being a doctor being of different level of responsibility “I hated my job [psychiatry] but I loved it as a student... I just found it really depressing as a doctor whereas as a student I found all the stories really interesting. (GP0P18)” “I don’t think you get the same experience as a medical student as you do as a junior doctor, no matter how much they try to, because you just don’t have that same responsibility. (GP2P12)” “the realities of the job set in... everything’s great when you’re a student because you can just walk away an hour before the work’s done... when you’re dealing with it as a doctor you have to see things through to the end of the day and all the negative experiences and all the arguments with patients and relatives and all the complaints. (GP2P15)”	- Consultants and team being supportive and help interns rebuild their damaged confidence “In my GP placement, had an amasing supervisor that was just really supportive and gave me feedback how it should have been given, and just kind of coaxed me through and built up my confidence again. (GP0P2)” - In other cases, losing confidence in certain areas, feeling uncomfortable in managing the intrinsic uncertainties of primary care leading to reluctance into choosing Gp “Even being in GP for those four months... dealing with, sort of, different, more chronic conditions and I really hated that I’d lost confidence, I’d forgotten things, I didn’t feel as confident with poorly patients. (GP0P10)” - Interns themselves finding opportunities to build confidence, using interpersonal skills, deal with variety and have access to supportive team which lead to positive experiences.	- Uncertainty if choosing GP then regular working hours would be achievable “With A&E you finish your shift and you go home, with GP you finish your surgery and then you do your clinic referrals and you do your letters and you do everything else and then eventually you get home and then you have other stuff to do and it just seems to take over your life. (GP0P18)” - Achieving good work-life balance, time for family and friends, exploring interest beyond medical work “I would love to do gastroenterology, but... I just know I wouldn’t have a good work-life balance. Work-life balance is really important to me, I’d probably say more so than what I want to do in my career... if I’m not enjoying myself out of work, it’s just not worth it for me. (GP0P10)” - Heavy workload in certain specialties and worry on patient safety “Paediatric registrars are incredible, they work phenomenally hard, they have horrendous hours... I		- Status and respect related to certain specialties and how it related to specialty choices “I don't care what my friends and family think, it’s the wider population. ... I had the girl doing my nails one day. She said, ‘Oh, what kind of doctor are you going to be?’ I said, ‘I’m going to be a GP’. And she said, ‘Oh, do you have to go to medical school for that?’ And I just thought, ... there’s just that a bit less respect, isn’t there, than, ‘Oh yes, I’m a brain surgeon. (GP1P16)”

			<i>don't want to be doing that for the rest of my life, I can't safely practice doing that for the rest of my life. (GPOP17)"</i>		
Ludwig 2018 Germany / Practice year / Specialty choice – GP CASP 16 (statement, relationship, ethics, valuable) / Satisfactory	- Unexpected responsibility of being a GP requiring business knowledge, bureaucratic burden of practice and restriction on medical work but the healthcare system <i>“Well, basically you end up running a medium-sized company, but never having learned anything of business admin [...], never anything about accounting, that’s shocking. (TN 5, Post, WB-, Rural-)”</i>	- Experience with diagnostic difficulty and using guidelines building confidence in treating patients. <i>“[...] and using guidelines and evidence-based structures, you were able to gain confidence in dealing with patients. [...] you’re a doctor on your own and you can be a very good doctor.” (TN 8, Post, WB+, Rural+)”</i>	- Expected workload with GP but more flexible working hours, however sometimes fluctuating depending on the organization of practice structure. <i>““Well, of course it’s a lot of time you end up investing, [...] But in return you also have the advantage of being free at lunch time, for example.” (TN 2 Post, WB+, Rural+)”</i> - Whether proposed career is compatible with having a family. <i>“I think, especially as a female GP, [...] it’s easier to manage having a family than, for example, as a senior physician in a clinic, with loads of weekend shifts, emergency shifts, being on-call etc. (TN 12, Post, WB-, Rural-)”</i> <i>“And that’s usually the reason why it fails, ’cos the family has to tag along. [...] especially your partner, but also the kids [...] they got their school, their friends, making it less likely you’ll move. (TN 1, Post, WB+, Rural+)”</i>		
Parker 2014 NZ / Final year undergrad / Specialty choice – GP CASP 20 / Key		- Positive experience including being included, feeling welcomed and part of the team, having their own patient list, many opportunities for practicing. Negative experience was worse than no experience.			
Olsson 2019 Sweden / Young doctor / Specialty choice CASP 17 (recruitment, relationship) / Key					- Status symbol related to different specialty being reminded constantly <i>“One is often reminded of that, that within the profession—although maybe it is actually only the case with other surgeons!—that surgery is a certain status symbol ...///... which also comes from the fact that you are responsible...///..., you have a lot of power, and you should be aware of that when you talk to a patient before an operation, because you must give due respect to the fact that, in that position or relationship, the patient is very much in the opposite role, with no power at all. And they’re about to lie unconscious on the operating table, literally putting their life in your hands. And I maybe think that maybe contributes to what I certainly experience as the traditional view that surgeons are something extraordinary and powerful. Certainly, many surgeons consider themselves to be so (laughing). But that doesn’t mean that physicians are as important, but...’ (No. 15, surgery, woman)”</i> - There is perceived status difference between specialties where surgery was the most prestigious and psychiatry and geriatrics are considered low status. Interns also have to defend their choices in front of others.
Querido 2018 Netherlands / Final transition year / General CASP 20 / Key	- Experience during internship rotations, knowing what it contains and finding out which interns enjoy most. <i>“Without an internship, you don’t know exactly what it contains. Yes, and when I started my rotations, that was the rotation, which I enjoyed most. Yeah, that is, hhhmm that is it.” (no.1, female)”</i>		- Choosing specialty based on the need for a work-life balance. Some also notice a work-life imbalance but are willing to accept it because other factors are more important. <i>“... the work-life balance weighs for me. If you want children and a wife then part-time work is attractive. I would like to work hard, but for me it is important that at some time the working day ends. I want to finish at the end of the day and go home and not be called in again. That consideration influences my career preference at the moment. (no 17, male)”</i> <i>“... I think about cardiology. It is sort of the only preference I have, although I also think of general practice as an option. Basically, I would like to focus on</i>		

			<i>cardiology. ... I think working hours will be heavy, but I do not think that is a reason to lose interest. It will be of big impact on my life, but I am willing to sacrifice that for it. (no. 24, female)”</i>		
Brodribb 2016 Australia / Junior doctor / Rural practice CASP 18 (relationship) / Satisfactory		- Negative experience with lack of professional support make interns feel not confident and anxiety-making <i>“I ended up in a rural hospital with no support with very unwell people, which I didn’t feel confident managing. I had a couple of experiences with extremely sick patients and just me, or me and one other person...looking after them. It certainly put me off working there as a more senior person, because I found that just highly anxiety-making.</i> <i>...So I find it a bit terrifying that I was with one other person with people intubated and sedated, for five hours waiting for a helicopter to come and pick them up. I think that’s something that would...change my decision making process [about working in rural areas]. (F, 31, Registrar, Z)”</i>			
Van Hamel 2020 UK / FY2 / Not going into specialty training CASP 20 / Key		- “Too early” to decide on a specific career path, lack of flexibility within training schemes, difficulty securing taster weeks <i>“I’m committing myself to another eight years of training and you don’t want to get that wrong”</i>	- The ability to take control of their time and also improving work-life balance,	- “Get off the treadmill” and look after own resilience and recharging.	
Beattie 2017 UK / FY1 / Specialty choice – psychiatry CASP 20 / Satisfactory			- Positive work-life balance in psychiatry, different with other specialties and more like a 9-5 working role, less rushed and more in-control. <i>“Overall I have enjoyed it. It was really nice environment to work in, it’s really nice having like a 9–5 kind of job that’s kind of not too stressful and I have felt like I am in control of the situation. (Participant 3)”</i>	- Emotional stress of psychiatry jobs and whether they can work with it in the future. <i>“When you’re with a patient and in particular a depressed patient...you feel emotionally drained at the end of it so I don’t know if I could cope with doing that all day for the rest of my life. (Participant 10)”</i>	- The placement facilitated more time to reflect and learn about the specialty, and the personality that fit different specialty, e.g. psychiatry need to be brave and make bold decisions <i>“People who work in psychiatry they do need to be quite brave and make kind of bold decisions, and obviously like the patient who we saw in the crisis team setting sometimes having to go down the route of a Mental Health Act and these aren’t easy decisions.’ (Participant 13)”</i>
Sreedaran 2018 India / Psychiatry resident / Specialty choice – psychiatry CASP 16 (recruitment, relationship, finding, valuable) / Satisfactory	- Clinical exposure and enjoying the rotation <i>“P7: “I worked in the psychiatry department in my internship and I felt that was the most interesting part of my internship. I actually thought that I could continue working like this for the rest of my life””</i>		- Preferring lifestyle in psychiatry as less hectic like surgery		
Woodward 2018 Sierra Leone / Junior doctor / Specialty choice CASP 14 (method, design, relationship, analysis, valuable) / Satisfactory	- Exposure during clinical experience as a medical student and intern. Whether the job content fit themselves from personality perspective <i>“I mean I’ve done rotations in all the disciplines...And I think [specialty] is like the most, it’s more me.” (JD2)”</i>		- Whether selected career allows close to their children etc. and some specialty training less time consuming thus allowing more time for family.		
Cuesta-Briand 2020 Australia / PGY1-5 / Rural			- Lifestyle factors, friendly people, less stress, a greater ability to maintain a good work-life mix <i>“I don’t think I could live in a big city now. As well as you can get from one side of town to the other in five minutes when there’s no traffic. You’ve got everything that you need in terms of shops. I’m not much of a city person, so yeah, just the lifestyle, being outdoors, camping and things like that. (I09; Female; PG3)”</i>		

CASP 17 (relationship, ethics) / Key					
Harris 2020 UK / FY2 / Specialty choice – GP CASP 19 (relationship) / Key	- The reality of some work make them realize it's not the right career for them; or realising that some specialties are very challenging <i>“‘I sort of thought that it would be something that would be well suited to me, in terms of what I like about medicine and I do like the kind of holistic care [. . .] Doing it now as a doctor has confirmed it to me but I just don't like it, it doesn't . . . it doesn't have everything for me if that makes sense.’ (FD21, CMT)”</i> <i>“I actually think they have one of the hardest jobs, being a general practitioner. [. . .] But I'm very conscious of lots of people telling me that general practice isn't what it used to be. [. . .] It sounds like a much higher-pressure specialty than it used to be.’ (FD23, undecided)”</i>	- Doing it and enjoying it, a powerful experience. <i>“‘I am doing it now as a job and it's great, I really, really like it.’ (FD8, GP)”</i>		- Pressure of GP life make the career less appealing.	
Rizan 2019 UK / FY2 / Not going into specialty training CASP 18 (relationship) / Key	- Not ready for decide which specialty to choose because of inadequate experience and exposure - Some felt that they do not have competitive enough portfolios, and taking F3 enable them to discover to reaffirm their interest.		- Taking time out to alleviate stress and exhaustion. Some were under pressure to work beyond 13 hours per day due to staff sickness, taking time out of training allowed individuals to regain their work-life balance with greater control over working hours.	- Taking time out to alleviate stress and exhaustion. Many felt that they were put in situations that they were out of their depth especially during on-call. They were unsupported by senior colleagues, did not have time to eat or use the bathroom. ‘it's a bit like PTSD I suppose’ (2017;1), and ‘it was low grade and didn't involve a psychiatric breakdown, but it was burnout by any other name’ (2015;1). Taking an F3 would help him to get his ‘mental health in a good place before carrying on’ (2017;1). - Reflecting their peers who didn't take time out as “pretty miserable (2015;4)” - Participants felt a loss of control across a broad range of factors during foundation years, including physical location and rotas. Participants also expressed great difficulties in arranging study leave or annual leave, feeling ‘controlled by rota coordinators’ (2016;5). Being trapped on a conveyor belt of education from school, through medical school and onto postgraduate training, ‘training ladder fatigue’, ‘they just can't face climbing another ladder’. Taking F3 enables to regain autonomy and do things of personal importance and own need. <i>“a step off the treadmill I suppose, because that's the thing, you can still work on your CV and you're still a better applicant and you lose nothing ... 'cause that year is a more enjoyable, fulfilling year for you as a human being.”</i>	
Appleton 2017 UK / Psychiatry trainee / Specialty choice – psychiatry CASP 20 / Key	- Having exposure to the specialty as med school experience very limited <i>“P6 male CT1 “I think if I hadn't had those experiences during medical school... although I didn't come away from this thinking, oh, I must definitely become a psychiatrist, it did make me think, well, I'd like to get more exposure to it, and it's because of that, that I chose a Foundation programme with psychiatry. If I hadn't had the Foundation programme experience, I probably wouldn't have decided to pursue it””</i>	- Feeling challenged to develop certain skills was appealing <i>“P5 female ST7 “There was something quite skillful about seeing these psychiatric patients and actually establishing a rapport with them and getting them to the right team.... that was the different kind of challenge””</i>	- Healthy work-life balance having influenced their choice <i>“P15 female CT3 “There seems to be a larger emphasis on work-life balance in psychiatry, they encourage people to take time out ...do things that interest them... it feels like they actually value their trainees””</i>	- Feeling lonely during FY training in psychiatry training <i>“P6 male CT1: “Being on call in psychiatry as an F2, you ...feel a bit isolated from other doctors” “Most of the psychiatry training happens in separate NHS trusts...””</i> - Emotional stress and the responsibility of making decisions	- Concern of losing medical skills and not being considered a “real doctor” or “proper doctor” <i>“P12 female ST6 “I think you get de-skilled quite quickly as a psychiatrist, because you don't deal with physical health problems...You become more like a mental health specialist rather than a doctor... I think that discourages people from wanting to do it...they don't get as much pride in being psychiatrists as...one would as a neurosurgeon.”</i>
Essa 2010 SA / Doctors / General CASP 17 (recruitment, relationship) / Key	- Exposure to different specialties and facilitated decision-making <i>“I think it helps you decide what to do further in your career because you're rotating through almost everything – Participant T, F [HJ/RM]”</i> - Elements of doubts and regret of choosing to continue with medical studies rather than something less challenging <i>“Initially you tell yourself „why the hell did I get myself into this, I could do anything else, I should have done anything else, I studied six years for this, do I need this crap in my life' – Participant J, M [Bara]”</i>		- High workload and long working hours, though not directly linked with career decisions	- Emotional stress, depression and anxiety, though not directly linked with career decisions	

Croghan 2020 Ireland / Intern / Specialty choice CASP 16 (relationship, ethics, analysis, finding) / Satisfactory	- The “real-life” aspect and authentic exposure; expectation vs. reality <i>“you try something and you like it, but then you have to find out about it, what its really like to live it (Ollie)”</i> <i>One recalled how ‘I initially wanted to do GP...[however] realised that I don’t like knowing bits of everything and much prefer to know one topic very well.’ One intern ‘had previously decided on anaesthetics’ but decided against it when ‘working with intubated patients in theatre’ did not appeal, whilst another ‘enjoyed studying the theory of psychiatry’ however found ‘the placement emotionally taxing.’</i>		- Observed/reported lifestyles with particular specialties and future flexibilities		
Firth 2011 UK / FY2 / Specialty choice – GP CASP 16 (design, relationship, valuable) / Satisfactory	- Might have discounted GP in undergraduate but now changed <i>“‘I’m seriously considering general practice now and I wasn’t considering it at all before, so it’s been a radical turnaround for me, and for the other fella who was in – he was the other foundation in my practice, we both radically changed our ideas, he wanted to do hospital medicine and I wanted to do orthopaedics, and it’s, yeah, I mean it’s just completely transformed the views that I’d formed as a student.’ (Participant: Int 7)”</i>				
Liang 2019 Australia and NZ / Women leaving surgical training / others CASP 19 (statement) / Satisfactory					

2. Exploring, experiencing, and witnessing workplace and organizational norms through working with supervisors, senior colleagues, peers and the team, and the community

	Relationship with supervisors/consultants	Relationship with peers	Relationship with senior colleagues and the team	Relationship with patient and the community	Characteristics and hierarchy of career options and specialties	Workplace location, condition, resources and environment	Feeling valued by the organization and healthcare system
Williams 2000 UK / PRHO / Specialty choice – surgery CASP 17 (recruitment, ethics) / Key					- Certain characteristics of surgery like surgery as “doing” rather than “thinking”, taking a narrow view of patients rather than holistically <i>“This is being a bit sort of generalising but I don't like the way surgeons think. I don't like not looking after patients, not getting to know them and that sort of thing. When you go on the ward round you just talk about the leg and whatever and there's someone sitting there I like surgery itself. I like the idea of it, but I just find that I get a bit irritated by surgeons, the way they think¼ most surgeons that I see, I see them and I think, I don't want to be like that. (PRHO 5)”</i> - Gender as a barrier pursuing career in certain specialties like surgery as no female seniors <i>“...but to go into a specialisation such as orthopaedics it's quite difficult, and I do fnd that a bit worrying...’Cos the registrars that have been through since I've been here, we've had two lots and they've all been men we haven't had any women. When I was at St J's (as a student) there were no female orthopaedic registrars there either. So yeah, it does concern me a bit because you might have all this hard effort trying to get to registrar level and then just get turned away because you're a woman, not a bloke. (PRHO 10)”</i>		
Scanlan 2018 UK / FY2 / General CASP 20 / Key	- Attracted to specialties where there are enthusiastic and supportive supervisors who are willing to take an interest in the professional careers of FP2 doctors and helps to make it an enjoyable experience, feeling valued, committed to look after their professional development and wellbeing. <i>“I think senior support at times was a huge factor for us, particularly in A&e. I'm never on shift without somebody who's at least a senior registrar or a consultant. ...When I went to A&E, my educational supervisor in A&E, she's very proactive. she's super. We did a lot of discussion around how I manage patients, so she'll call the patients up that I've seen X number of weeks ago, and we go through and look at my documentation, see how I managed it. And it's not criticising me. I mean if it is critical, it's constructive criticism. so I think that's a huge, huge aspect of learning as a junior. And that's the first time I've had a supervisor that has been that enthusiastic, and that makes a hell of a difference ... She even creates</i>		- Feeling a valued member of the team, the seniors are eager for interns to learn on the job. <i>“... when I got out I was actually doing the job because I could have easily just been given rubbish tasks to do for 4 months but I was encouraged to take part and work with a wide variety of consultants, see how they worked and becoming, like, familiar. (Story 2 Steven)”</i> - Other seniors or team member are not supportive and blame interns for their faults. <i>“And there's huge neglect of training for foundation doctors, especially at FY1 level. I don't think that you're respected or considered to be a practising clinician. I think there's not much in the way of recognition for the work that you do. And I think that you do a lot of legwork for a lot of other people. And people aren't very thankful of that. I don't think that you're treated well by other members of healthcare professionals within the teams. And that makes your role feel devalued as well. You feel devalued in that sense that other people don't treat you very nicely at all. (Story 3 Abigail)”</i>			- FY doctors feeling disheartened by the NHS and never expected to be treated so badly as a professional. The NHS does not value or care about their wellbeing. Consider FYs as a hassle or a problem. <i>“I don't think if you went to any other institution, any other organisation, anywhere as a professional, or in any other business they would make you feel crap in the first... You know, having that first experience, you know, I mean, you know what I mean to work somewhere in the first year. You just feel totally disengaged, and very down trodden. And you feel undervalued. I found it really disappointing. Like, I've spent years training to do this job. And I really, really wanted to do it. I've always wanted to be a doctor. And I got here, and I've just found it devastating. I've really been so disheartened, and just put off with the profession as a whole just because the way in which the work is.’ (Story 3 Abigail)”</i> <i>“the thought of actually having to spend any more time in that hospital is just horrifying, but I think...So the thought of having to do six, seven years</i>	

	<i>opportunities for you.... And then that leads into feeling valued. (Story 1 Daniel)”</i>		<i>“I did have a case, when I was in paediatrics, where I didn’t feel supported at all by my seniors. In fact, the opposite, by the consultants, and it really upset me and got me down and affected me for months, so... And at the end of that, I thought, no, I don’t want to. I decided to take a year out from that. There was a patient that became seriously unwell, that I didn’t know that the baby was unwell, and then got, kind of, blamed for it afterwards, despite the fact that I tried to escalate it and they didn’t really, like, want to take any kind of responsibility. And I tried to get some help and no one would come to help. And then I, kind of, got blamed for it and not supported through it, not debriefed or... I just, kind of, felt like it was my fault and then I had to kind of process it and deal with it on my own, rather than having... We have our clinical and educational supervisors that are meant to help us through those, like, the emotional aspects of our work, as well as all the practical aspects of just getting through the course. But it, it all, they’re all consultants that take on that role, so... And obviously, every personality differs, and everyone... so I was just unlucky that all of the consultants there didn’t really seem to care about that. And there wasn’t anyone that I felt like I could ask. (Story 4 Gemma)”</i> <i>“I would have said, there were certain bits that have made me think, I’m 100% positive I don’t want to continue working in this hospital. And I would have said... My second job in the FY1 was {a surgical specialty}... There was meant to be two FY1s and two FY2s. The FY2s were on the registrar rota, which was hell on earth for them, and therefore I was the only FY1, and there were no FY2s because they were on the reg rota. And I was put in horrific, horrific situations... there was one horrendous weekend where I had three people in the HDU, had sixty patients, and then I had another four beds due where I had four people that were really sick with pneumonia. And I hadn’t had a medical job, and I didn’t know what I was doing, and I have never in my life felt so overwhelmed, and I just... I hated it, I absolutely hated it. I didn’t get support; I’d phone the registrar to come in, they came in in the morning for an hour, did a ward round and just left. And I was left on my own for a full weekend”</i>				<i>to consultant, there’s no way. there’s literally no way I would do it. Management don’t know who I am, don’t know what I’m about. And if I raise a concern, I think they see that you’re a hassle, it’s a problem, as opposed to, you’re a valued team member that they think is worth being there. I don’t, yes, I don’t feel valued in that capacity. (Story 5 Clare)”</i>
Alberti 2017 UK / GPSpR / Specialty choice – GP	- Role models influencing perception of GP <i>“So I think role models is what changes perception, we need people to stand up and help change things”</i>		- Hearing consultants, junior doctors and nurses criticising GPs for example for “rubbish” referral <i>“I think one of the reasons why I didn’t just apply for GP straight out was because the people, the medics that I was with were saying, well you’d be</i>		- GP being considered as very simple, not using or possessing particular skills, failing to independently manage medical problems, frequently referring <i>“GP’s just being very simple, managing very simple things and you’re not going</i>		

CASP 16 (recruitment, relationship, analysis) / Satisfactory			wasted you should be doing medicine ... and they tipped me away from where I've actually ended up, if that makes sense"		to be using your brain that much, you're not going to be using your clinical skills that much it's just talking and talking. (Senior registrar)" - "Just a GP" frequently reported when trainees are discussing career options with more senior clinicians. They would even use this term themselves – linking with the idea that GP seen as inferior to hospital specialties. "you're too good for GP' - like that was kind of what he was getting at."		
Merrett 2017 UK / FY1 / Specialty choice – GP CASP 16 (design, relationship, analysis) / Satisfactory	- Witnessing characters of poor role models during placement within primary care, do not want to become such doctor (unclear if this was in medical school only or also refer to internship)		- Witnessing GPS being stressful and burning out "Yeah. I've come across GPs that are going through, like, litigation processes, and have been absolutely burnt out with it. I think everyone at some point, whatever specialty, will miss a diagnosis. But you're much more open to litigation in general practice.' (Participant, group 3)"	- Ability to provide continuity of care spanning many generations in GPs, building doctor-patient relationship "I like the fact that I could build up a picture of the family dynamic. Then you'd always have something to talk about from their last appointment, and I think it's more enjoyable when you can see the work you've done is going well, and the fact that you can remember them makes the next consultation easier, because you've already got a foot in.' (Participant, group 4)"	- Lack of respect for GPs. Interns ashamed to mention it in the hospital environment for fear of prejudicial treatment. Negative comment of GP "everywhere" "I'm on general surgery, and I think surgeons, they do not respect GPs. I think they kind of undermine the GP's potential or achievement in life. They say: "Oh, you only do GP if you're not smart enough." I remember when I was on my ward round, a surgeon just said to me: "The people who do GP are the ones are like the bottom of the year", and I just looked at him. I was so shocked when he said that, because that is just an inappropriate comment.' (Participant, group 5)"		
Smith 2018 UK / FY1 / Migration CASP 20 / Key	- Having consultants as mentors for providing career advices "My consultant [in a previous job] was very good in encouraging and looking at options and she was probably the person who gave me the most advice about careers. I found that immensely useful, so I think to have some kind of continuity with someone who could be a mentor would have been probably very helpful. (P8)" - Bullying from consultants make F2s want to leave the UK as the feedback they get is Australia and New Zealand is different "I was sitting flicking through a massive set of notes and then the consultant walks round the corner and goes; 'What are you doing?' and shouts at me in front of all the nurses, everyone on the ward. Then when you get a bit tearful tells you to grow up in front of everyone, very publically. Numerous occasions like that, particularly in surgical jobs. Just being made to feel that you're never good enough and never getting any thanks for what you do. I don't know for sure that that's different in Australia, but from all the feedback I've got from everyone that's in Australia and New Zealand working at the minute it appears to be quite a bit different. (P2)"	- Other junior doctors being viewed as important social relationship. Lack of peer support led to loneliness and poor enjoyment. "You're working with the same big bunch of people. So, you get to know quite a lot of people. It was a really good sided job actually for me, for making friends and creating like a social circle. I actually did quite enjoy it.' (P13)" "I think also it's been quite a lonely job because you are by yourself a lot of the time. We don't have F1's. We don't have registrars. I didn't realise how much that can affect your job satisfaction... ..because thinking back all the other jobs I've had have been in really big teams and perhaps even when we were busy and it was maybe a bit stressful you could moan about it to somebody else and the loneliness affects you I think...(P1)" - Leaving the UK will support their peers as there will be less competition for them "If you look at people leaving as a whole it will make the jobs easier to get in some ways because they'll have less competition. It's different if you're leaving a rota, if you're already in a training position, but it shouldn't affect my colleagues because I've no obligation to be there in that hospital. (P7)"	- Senior colleagues like registrars not being supportive "In neurosurgery the registrars weren't very... they're not a very supportive bunch. There's someone suddenly blowing a pupil and you're like, is this person dying? What am I going to do? They'd be like, 'I'm busy, sort it.' (P3)" - Poor relationship with the nursing staff affected the enjoyment at work "The nursing staff wouldn't listen to me. They would then go and get consultants and run everything I did past them. There are some strong characters in that department and it's well known that that is the case. I just clashed with them and I find it quite condescending and made me feel like, that you weren't a doctor, that you are more a medical student because everything you said had to be verified by a consultant. (P9)" - Unfavourable experiences working with locum "Sometimes you can get people that are completely new to the specialty and healthcare around the UK or even healthcare at all and that can be more challenging. They're at my level and they're filling up a gap in my rota slot at my level but at the same time I find them depending on me...which can be a bit difficult. (P16)"			- The working environment and morale within the NHS being considered as poor, whereas the working environment in Australia and New Zealand is considered more pleasant. "There's just a lot of kind of negativity in the NHS at the moment amongst junior doctors and I don't know if it's become a bit of a culture thing as well... We have great resources, a great structure, but something at the moment isn't working. We don't have enough money or we don't have enough doctors and it's just a horrible environment to work in I think. (P8)"	- F2 doctors think Australian and New Zealand healthcare organizations value their staff more than the NHS. Lack of support from NHS to help resolve work-life conflicts, "How often have you stayed overtime and got no...no one thanks you for it. You get upset because you're hungry, tired, haven't gone to the toilet and you're never getting paid for it. (P10)" "I suppose medics are viewed in a better way [in Australia], just more respect. The patients probably pay a bit of insurance and they do have to take accountability for their own health care and that way they do then value all the healthcare professionals more, not just the medics.' (P6)" "We know for a fact that we have three vacancies coming up in our rota, and they've done nothing to try and fill them, because in the end they're just going to email round us, rather than getting a locum... and the thing is we do, we do still fill it because we need to, the patients need us.'(P9)" - F2s unsure about how to raise concern and they might be penalised for doing so "How are you supposed to give any of this feedback to the top people, because where on earth are they? I think also sometimes you're worried if you had a concern and you expressed it, that number one, it would fall on deaf ears, and also would you be

							getting into trouble for expressing concerns? (P9)”
Spooner 2017 UK / FY2 / Specialty choice CASP 18 (relationship) / Key	- Consultants being mentors engage and inspire interns, being supportive and help interns rebuild their damaged confidence “One of the consultants... went through my portfolio with me... he’d bring me along, he’d teach me, he’d let me get involved. He was absolutely a mentor. (GP0P17)” “In my GP placement, had an amazing supervisor that was just really supportive and gave me feedback how it should have been given, and just kind of coaxed me through and built up my confidence again. (GP0P2)” - Or in sometimes, supervisors inadequately supported interns for difficult work. “In stroke, the consultants were there in the morning, for an hour, for ward rounds, and then disappeared... whereas in a lot of other specialities, they gave us their mobile numbers, or they said, don’t hesitate to contact us... similarly, our SHOs... took a bit of a step back. And I just didn’t feel as supported... It was very hard work, it was very intense. (GP0P17)” - Consultant being supportive of GP career choices and also psychiatry choices.		- Getting familiar with training requirement, working practices, and opportunities with different specialty careers while working with specialty trainee, which is important in informing specialty decisions. “The taster I think helped me because it gave me an idea of what... the kind of people would be like, see what the patients would be like. That, kind of, made me think—yes, I could probably do this... I really felt like they tried to, like, integrate me into the team.” (GP0P11)” - Interns feel drawn towards supportive teams who engage and inspire them or help them rebuild their damaged confidence “I met a few people there [psychiatry] who were really encouraging and also were really passionate about the work... I’d say that was the one thing where there [were] people involved that I thought this is what I want to do. (GP0P11)” “I’d like to be around a caring, friendly, supportive team, because that will... I feel like that will make me more caring, supportive and friendly, whereas, in a more direct blunt specialty, that’s...I’ll definitely become more like that and it’s not someone I want to be. (GP2P3)” - Working in supportive teams could transform a new or worrying situation into positive experience. - Witnessing registrars that are “broken” and consultants present until 23:00, interns switch career plan to a different specialty to avoid extended commitment. - Appreciate working in teams where colleagues demonstrate similar preference and reject teams who act differently “They weren’t interested really, it wasn’t their job and I don’t really want to be like that, I’d rather listen to what the patient wants and adapt than just stick on my road. (GP2P3)” “Consultants... junior doctors that I’ve worked with, the registrars and the SHOs, I’ve felt like they’re quite similar to me... they all cared a lot about the patients, they saw them as people not just disease processes and listened. (GP1P6)”		- Some specialty training programme being viewed as highly structured, intensive, competitive and demanding whereas other being rated as unworthy or unexciting “A lot of the best candidates go for very competitive specialties... because a lot of medics are competitive, by nature they’re very driven people and they like to do the best thing; so when something is portrayed as a lesser thing then I think almost psychologically they’re less inclined to go for it. (GP1P4)” - GP being viewed as nothing better than a reserve option by both interns and specialists. Interns had kept quiet to avoid being badly thought of or excluded from specialist training. “There was an image of a GP as being somebody who’s, kind of, failed every other speciality, not able to get into a speciality, so they’ve given up, they’ve become a GP... and it subconsciously roots into your mind. (GP1P13)” “When I told her [oncologist] I was going to be a GP, she looked at me and she said, oh, are you pregnant? (GP1P16)” “Oh, why do you want to do [GP]?’... it just seemed a boring pursuit for them... it put me off a bit. I mean because I didn’t want to be thought of as the one who wasn’t trying hard... or wasn’t going to like put their hand up for something that maybe wouldn’t be relevant to my future. (GP1P14)”		
Ludwig 2018 Germany / Practice year / Specialty choice – GP CASP 16 (statement, relationship,				- Working with the community and able to being integrated into a rural community “Well, I think, with a job that [...] really brings personal benefits for the locals [...] I think it’s easier. (TN 5, Post, WB-, Rural-)”			

ethics, valuable) / Satisfactory							
Parker 2014 NZ / Final year undergrad / Specialty choice – GP CASP 20 / Key	- Contacts with general practitioners being the biggest influence for attitude towards GP. Observing GPs with good practise and excellent bedside manner vs. observing poor practice (less well regulated).		- Other junior doctors who want to pursue GP as a career and GP trainees as potential role models. Their behaviours also influence interns’ decision. <i>“There are the house surgeons that want to be GPs... they make you realise that it’s not just lazy ones that want to do general practice. They are actually a lot of talented, smart, good doctors. (#6)”</i>				
Olsson 2019 Sweden / Young doctor / Specialty choice CASP 17 (recruitment, relationship) / Key	- Encouragement and lobbying from supervisors can impact interns’ choice of specialty <i>““Well, probably, yes, but there were many mentors that you had when you went ‘round to different departments who were really like, ‘Seriously, you should start in our specialty’! There was a lot of lobbying, like in paediatrics or gynaecology; ‘We need more men here. You should apply’! or ‘You’re good with children. You should start here in Paediatrics’. That kind of thing. Certain specialties are really persuasive’. (No. 3, internal medicine, man)”</i>	- Interns socially both professionally and privately with other doctors, and the former include also meetings and other events organised by specialty associations, the union or network set up for future specialty training. - Competition between peers on certain specialty, one must elbow one’s way into the theatre to become a good surgeon. This sometimes put interns off. <i>““At the surgical and orthopaedic departments where I’ve been, you need to be fairly assertive, even bullish, to somehow get the educational experience you need. You have to make sure you get into theatre, struggle, really, and hinder others in your way to becoming a specialist. And that was not something I had any desire to do. Being somewhere where there was a lot of competition, I wasn’t interested in that. At all’. (No. 5, internal medicine, woman)”</i>					
Querido 2018 Netherlands / Final transition year / General CASP 20 / Key	- Specialty clinicians being role model or mentor and “want to be like her” <i>“One of the general practitioners during my internship, she was a role model for me. How she treated and communicated with her patients, her knowledge, everything she did. I really saw an example in her and I want to be like her when I become a general practitioner myself. (no.14, male)”</i>	- Student or peer-initiated information collection, extra-curricular activities medical students proactively undertake to gather information to make a career choice, such as voluntarily shadowing doctors in a preferred specialty, visiting medical career events or workshops, participate in a medical career event committees. These information provide more information or the possibility to check their personal questions with someone with more experience or knowledge.	- The characteristics of team and colleagues are important. Interns sought to be part of the team, to participate in the teamwork, to have colleagues and to identify with the features of colleagues. <i>“...Yes, this specialty really got me, I liked that. I am attracted by a nice team and this was a nice team.” [...] Yes, the entire team, the gynaecologists and the residents together. I did not experience that before, where people respectfully work together and at the same time enjoy work and are not too serious all day. I feel at home with them. [...] I do like doing things on my own, but I really want to work in a team, definitely. (no.6, female)”</i> <i>“...I think it is also the colleagues that I see, they are like me. So, it is the combination of the specialty and the colleagues” (no.20, female)”</i>	- Characteristics of patients and previous experience working with patient contacts <i>“...I just like old people. As a student, I worked a year in elderly care and that really brought me pleasure. I enjoy being in contact with those old people. (no.2, female)”</i>			
Brodrigg 2016 Australia / Junior doctor / Rural practice	- Positive experience and support from supervisor strengthened positive attitude towards rural practice. Lack of support negatively impact the likelihood of rural career choice. <i>“I certainly didn’t [feel out of my depth]...not in [regional town] because</i>			- Living experience in regional city changed interns’ perception of where they want to work. Enjoy the friendly people. <i>“The people were more friendly. The hospital was more friendly than the city hospitals...Rather than feeling like a stupid medical student like I did in the</i>			

CASP 18 (relationship) / Satisfactory	<i>it's a bigger centre so in the general practice you always basically talked about whatever you'd seen with your supervisor. In the emergency department...we were always supervised and supported by the staff there. (F, 26, Registrar, Z)"</i> <i>"The surgical one [intern] was challenging, but the emergency rotation [PGY2] was a very bad one. It was very unsupported. As someone who had been a doctor for slightly over a year, I was the most senior person in the emergency department overnight and asked to supervise two people who were more junior than myself... (F, 27, PGY2, Y)"</i>			<i>city, I felt like part of the team...and then I stayed on for another year and actually my husband and I bought some property nearby, so we're still part of the time in the city and part of the time out there. (F, 34, Registrar, Y)"</i>			
Van Hamel 2020 UK / FY2 / Not going into specialty training CASP 20 / Key		- Comparing with peers who take time out of training, some interns may feel they are disadvantaged if they did not do that, they would be missing out positive experiences, or earning more through locums – a “cultural norm” - Positive recommendations from those who have experienced an FY3 themselves.				- Poor rest facilities, limited access to catering facilities and expensive, limited parking impacted on their feelings of being unappreciated. This negatively impacted on doctor's feelings of self-worth. Doctors felt that the pressure put on them in the workplace from workload, pressure to cover rota gaps and poor facilities increased their frustration at work and negatively impacted on their feelings of being appreciated	- Feeling unvalued that they were only valued for service provision. “Cheapest option” to fill rota holes, “you are doing two people's job and also kind of undervalued because of that” - Frustrated by administration leading to losing motivations. “you know nothing is going to be straight forward, you are going to have to chase people around”. Even those who felt motivated to request study leave or try to work towards outside goals were frustrated by the administration processes required for these and sometimes unable to achieve these goals because of this. - Lack of support from the foundation programmes with regard to options available, retraining to work etc.
Beattie 2017 UK / FY1 / Specialty choice – psychiatry CASP 20 / Satisfactory							
Sreedaran 2018 India / Psychiatry resident / Specialty choice – psychiatry CASP 16 (recruitment, relationship, finding, valuable) / Satisfactory	- Psychiatry role model		- Influence from seniors and discussing/seeking information from them <i>"P11: "I had considered it as an option but not the first option. But later on, when I spoke to my seniors and some of my family friends who had been in psychiatry, had taken up Psychiatry already I realised I can do it. So then I chose psychiatry because of that""</i>			- The process of postgraduate medical selection and preference for central institution training	
Woodward 2018 Sierra Leone / Junior doctor / Specialty choice CASP 14 (method, design, relationship,	- Role models are important sources of inspiration and gaining a preference for certain clinical specialty. Nothing what they say but also how they behave. <i>"What motivated me to [clinical specialty] is that I mean the [specialist] that we have now, Dr [x] he's very good. When you're posted to Dr [last</i>	- What other peers choose to do and realize a gap in the country <i>"Because so many people [junior doctors] want to do [clinical specialty X]. And there's nobody who wants to do [clinical specialty Y]. And you see your country growing backward. Someone has to take that risk or let me</i>		- Witnessing the need of the people and decided to serve the community <i>"If there's anybody who needs healthcare it's mothers should come first. Because they are like providing the world for us. So I saw [in my internship] the types of pains they [mothers] go through. And I had a</i>	- Different popularity of specialties and the need to fill the gap for less popular ones <i>"Because so many people [junior doctors] want to do [clinical specialty X]. And there's nobody who wants to do [clinical speciality Y]. And you see your country growing backward. Someone has to take that risk or let me</i>		

analysis, valuable) / Satisfactory	<i>name] the [specialty] he would explain. It was so simple, it was so easy, you would understand everything. (JD12)”</i> <i>“Almost all [specialists x] in our hospitals here and at COMAHS, they are very nice people, unlike the [specialists y] people. They have some attitude problem. Some of them are like proud. (JD4)”</i> <i>“I’m not the [specialist] type of person so I’m not going into [specialty] (JD8) ”</i> <i>“It’s [specialist] more of who I am; It fits into the kind of doctor I think I am (JD2).”</i>	<i>say to specialise in [clinical specialty Y]. (JD11, Oct 14)”</i>		<i>change of mind that no I should stay here to help. (JD14)”</i>	<i>say to specialise in [clinical specialty Y]. (JD11, Oct 14)”</i>		
Cuesta-Briand 2020 Australia / PGY1-5 / Rural CASP 17 (relationship, ethics) / Key		- Positive interpersonal interactions with peers and senior staff, being familiar with people around them and developing a sense of community. Wanting to maintain already established personal relationships. - Such relationship extend beyond workplace, some personal friendship and socialising. <i>“I was very familiar with the place. I actually knew a few people working there already. It seemed like a nice place to work and I quite enjoyed being at [urban hospital], so I thought I might as well just stick around for a bit longer while working as well. (I16; Male; PGY3”</i> - Peers as valued source of support and influence career decision-making as they are the main source of information on training and work opportunities.	- Highly value supportive and friendly teams, approachable senior staff, easy access to consultants. Smaller teams with better personalised training. <i>“I opted to go to [rural location] under the surgical team for my surgical term and really, really enjoyed the smaller hospital, the more intimate and close-knit working environment and the smaller teams and how they kind of worked and do well together at first-name basis. When I went back to Perth to this big tertiary hospital with a whole lot of people who don’t know your name, it’s not as personable so to speak. I really missed and longed for that small work group that I experienced in [rural location]. (I06; Male; PG2)”</i> - Career information and advice received usually from colleagues, personal network as there is an information gap, the information was “out there” but not easy to find. - Career advisors and mentors are providing a valuable link to choosing career (though unclear who are those people)			- Supportive work practices, and flexibility of contractual arrangements positively influenced doctors’ experience of their workplace	- Perceived administrative assistance influenced doctors’ experience of their workplace
Harris 2020 UK / FY2 / Specialty choice – GP CASP 19 (relationship) / Key			- Some seniors being very supportive of junior’s career plans <i>““No senior would ever say, “Don’t do that. That’s a terrible specialty.” If you show interest in anything, they’ll support that regardless of what that specialty is.’ (FD2, surgery)”</i>		- Criticism of GP from general practices. <i>“A lot of the surgical registrars were dismissive of GP referrals and what they thought of GPs in general was very negative. (FD9, GP or psychiatry)”</i> - However banter of specialties is seen as a natural consequence of passion for one’s own specialty, not something that affect their own opinions <i>“It wouldn’t matter to me about a reputation or what people think of a certain specialty. If something interested me, it wouldn’t bother me what other people thought about it, I’d just do it.’ (FD17, undecided)”</i> <i>““I think there are certain specialties that get made fun of. It hasn’t really had any impact on my decision making. I think probably because they get made fun of, partly, because people are jealous.’ (FD24, anaesthetics)”</i>		

Rizan 2019 UK / FY2 / Not going into specialty training CASP 18 (relationship) / Key	- Being warned against the concept of taking time out of training by consultants, being told “it would be career suicide (2015;4)”. However for others, their consultant were supportive.	- Career choices validated by their peers who are similarly taking the same one, finding this reassuring. Whereas participants who started earlier when it was not yet a norm were less certain and nervous. <i>“I would have been an odd one out, if I’d gone [straight] into training (2016;1)”</i>	- Not supported by senior colleagues also due to staff shortage.			- General morale appeared low at workplace because of the stress and exhaustion.	- Junior doctors feel undervalued and under-appreciated. Participants described being treated ‘like a ward mule’ (2015;2) or feeling used for ‘service provision’ (2017;2).
Appleton 2017 UK / Psychiatry trainee / Specialty choice – psychiatry CASP 20 / Key	- Consultants not being supportive of career choices/bashing psychiatry			- Enjoying the opportunity to work with patients and involvement of the psychosocial aspect of their care	- Negative experiences and some stigma towards working with people with mental health difficulties <i>“P17 female CT2: “There is always a stigma. In my medicine F2 post ... I had just finished psychiatry and when I said that I wanted to do psychiatry my consultant said something like ‘then there is no point bothering with you then’.” ...”</i>		
Essa 2010 SA / Doctors / General CASP 17 (recruitment, relationship) / Key	- Poor supervision leading to emotional stress and limited opportunity to learn, though not directly linked with career decisions					- Wil be willing to work in the public sector if better salary, improved working environment and less bureaucracy	- Sufficient amount of funds being allocated to the public healthcare sector but that these budgets were being seriously misused. Hospitals are not being adequately upgraded; much-needed equipment is not being repaired and essential resources are not being purchased or adequately distributed. There was also a sense of despondency from participants as they mentioned that there was a lack of accountability from people in senior positions, thus it became a frustrating environment to work in and provided reason for healthcare professionals to leave public hospitals <i>“Government giving us budgets...people misusing the budget completely. We’re in the stock-room - look at this equipment, it’s from the 1980s! From the 1970s, „60s! I mean look at that machine – that’s probably older than both you and I, our ages put together! But its just you don’t get the support from your seniors...there’s no stock. You want a drug and there’s no stock, you want a drip and there’s no needles, its very frustrating in that kind of sense that your superintendents and your higher up who are running the place...ja so that’s why everybody is leaving – Participant D, M [Bara]”</i>
Croghan 2020 Ireland / Intern / Specialty choice CASP 16 (relationship, ethics, analysis, finding) / Satisfactory	- Consultants as role model and highly influential in career choices - Open encouragement, observed skills/satisfaction, personal interactions with consultants and senior doctors; or on the contrary, discouraging (due to lifestyle factors, poor training schemes), negative personal interaction, bashing other specialties, consultants themselves being dissatisfied, or having poor lifestyle		- Rapport with the clinical team, good relationship led to good experience and increase opportunities <i>‘Actually the three main, very different, specialties I’ve been interested in...the common factor was really good experience on rotation and good fun with the team’ (James). Good rapport was associated with increased opportunities, such as being ‘brought along to theatre’ (Sarah). The structure of clinical placements affected students’ abilities to foster</i>		- Bashing particular specialties, “one had been told her chosen subspecialty was ‘not worthwhile or proper surgery,’ whilst others perceived that ‘GPs are considered lesser doctors’ and that ‘everyone moans about [surgeons].”		

			relationships, ‘if you’re only on a specialty for one week you don’t really get to know the team’ (James). <i>“the environment and doctors in some specialties are so negative that I would be completely opposed to...the specialty just based on the hostile and negative people that populate it.”</i>				
Firth 2011 UK / FY2 / Specialty choice – GP CASP 16 (design, relationship, valuable) / Satisfactory					Hearing bashing from hospital doctors and senior colleagues, their own mind being reinforced by the interaction <i>“When you’re in conversations with medics or surgeons they would be saying – every now and then, they would say GPs do this but that’s wrong, this is the way it should be done, or this is such a rubbish referral from a GP or why on earth did the GP send this in and then you start to get the same sort of opinion.’ (Participant: FG10)”</i>		
Liang 2019 Australia and NZ / Women leaving surgical training / others CASP 19 (statement) / Satisfactory	Insufficient role model leading to leave surgical training <i>“...once I left [my sole female role model] where I did my intern years... I actually didn’t have another female consultant until I was a registrar [specialty trainee]. So all through my PHO [non-training registrar] time, they were all male consultants so it wasn’t even an option. (Participant B)”</i>				How gender aspect of lifestyle, sexism, discrimination, harassment lead to women leaving surgical training, though unsure if they are during internship training or later		

3. Worrying about future – will I get a job and get advanced

	Job market polices and changes, job security: will I get a job	Future training and professional development opportunities: will I get advanced
Williams 2000 UK / PRHO / Specialty choice – surgery CASP 17 (recruitment, ethics) / Key		
Scanlan 2018 UK / FY2 / General CASP 20 / Key		- Choosing specialty because of the perception of support that would be available in the future, level of commitment from seniors, evidence of the level of investment and value the organization places on personal and professional development <i>“I’ve done it and I liked it... When you see what they do and how they... how well-supported they are as a junior. So they’re probably the best trained in terms of consultants with juniors. so you’re one-on-one, junior and consultant most of the time as an anaesthetic trainee. The training you get is... You know, they’re able to deal with nearly everything, in terms of managing patients. That’s what attracted me to it as well is the quality of training you’re going to get. (Story 1 Daniel)”</i>
Alberti 2017 UK / GPSPR / Specialty choice – GP CASP 16 (recruitment, relationship, analysis) / Satisfactory	- Negative comment about choosing GP due to uncertain future of the NHS <i>“anyway my consultant was trying to discourage me from getting onto the GP programme, saying that, it might be appealing now but he doesn’t think that things will remain as such in the future”</i>	
Merrett 2017 UK / FY1 / Specialty choice – GP CASP 16 (design, relationship, analysis) / Satisfactory	- Uncertainty of workload and the impact of government cost-cutting on GP salaries, handing over clinical work to other healthcare staff, uncertainty about increase in privatisation of the NHS <i>“It’s the whole: “Are GPs going to work weekends? Are they going to work evenings? Is it going to be 24 hours a day, 7 days a week?” With most of the hospital specialists you expect that to an extent, but while it’s all in flux I think it’s a bit unrealistic to expect lots of people to want to go and do it when you don’t know what you’re getting, letting yourself in for.’ (Participant, group 3)”</i>	- Uncertainty about the length of GP training
Smith 2018 UK / FY1 / Migration CASP 20 / Key	- Proposed changes to junior doctor contracts in England provoke mixed emotions <i>“I always wanted to work in London, so if I was applying for CMT1, I would have liked to have apply down South. [But] there was a lot of uncertainty and there’s still a lot of uncertainty now about what the contracts are going to be like. I think they have started releasing the provisional contracts now and they look terrible. You’ve been paid less and you’re working a lot more and you’re working one in two weekends. It didn’t seem like a good thing to trade rather than working somewhere where there is a good work life balance and sunshine and people appreciate what you do for a living in Australia—why would I want to move to England? (P12)”</i>	- Perception of better formal teaching in Australia than is provided in the UK <i>“One of my friends who is working out in Perth [Australia], has said actually she has like hourly sessions kind of every other week where she’ll get bedside teaching. That’s way above and beyond what I’ve had. I don’t think I’ve had bedside teaching beyond what happens on a ward round. (P13)”</i> - Concern of getting jobs that no one else want, low-quality job <i>“My impression is that basically you end up with the jobs that no-one else wants from Australia or New Zealand. Quality-wise you’re probably ending up in a job that is less good than you would get in the UK but as a friend of mine put it to me you’re not going there really for the clinical exposure... most people are going there because they want a different experience.’ (P1)”</i>
Spooner 2017 UK / FY2 / Specialty choice CASP 18 (relationship) / Key	- Changes to junior doctors’ contract increased career uncertainty leading to shifts in ST programmes’ attractiveness, e.g. more interest in GPST as they have shorter training programme and also more broadly as a profession <i>“Three years’ training is the minimum which they [GPSTs] could do to get a job which would then allow them that freedom to either move or to determine their own contract... So I think if anything perhaps the contract has pushed people towards GP just because of the training period, giving them perhaps freedom a little bit earlier. (GP2P12)”</i> <i>“I’m just a bit worried that the NHS is such an unknown at the moment in the future and... that’s my whole career... But I feel more and more that these people who work in the government are not really respecting us as a profession. (GP1P8)”</i> <i>“With the way the current contract changes and the way the current health service is, I don’t think I’d want to work in an acute specialty anymore because I just think that’s the way to a burnout. (GP1P1)”</i>	-
Ludwig 2018 Germany / Practice year / Specialty choice – GP CASP 16 (statement, relationship, ethics, valuable) / Satisfactory		
Parker 2014 NZ / Final year undergrad / Specialty choice – GP CASP 20 / Key		- Shorter training schemes sounds more attractive

Olsson 2019 Sweden / Young doctor / Specialty choice CASP 17 (recruitment, relationship) / Key		
Querido 2018 Netherlands / Final transition year / General CASP 20 / Key		- Whether there are chances to obtain a residency position as some specialties are more competitive and popular, or have higher entrance criteria.
Brodrigg 2016 Australia / Junior doctor / Rural practice CASP 18 (relationship) / Satisfactory		
Van Hamel 2020 UK / FY2 / Not going into specialty training CASP 20 / Key	- Worry about becoming unemployed or having no confirmed role within a year, reservation on impact on their pension and future pay.	- Feeling instead of being trained for a future career, more towards being responsible for mundane jobs and leaving little benefit for personal development <i>“especially in my FY1 a lot of the tasks I did almost felt administrative and I wasn’t learning or using what I’d learnt throughout medical school.”</i>
Beattie 2017 UK / FY1 / Specialty choice – psychiatry CASP 20 / Satisfactory		
Sreedaran 2018 India / Psychiatry resident / Specialty choice – psychiatry CASP 16 (recruitment, relationship, finding, valuable) / Satisfactory		
Woodward 2018 Sierra Leone / Junior doctor / Specialty choice CASP 14 (method, design, relationship, analysis, valuable) / Satisfactory	- Choosing public health degrees to become more employable.	
Cuesta-Briand 2020 Australia / PGY1-5 / Rural CASP 17 (relationship, ethics) / Key	- Contractual arrangement and sustainability of certain specialties also influenced career choices although to a less extent - Choosing specialties that allow interns to “live in the country” <i>“To a certain extent, my choices—sort of anaesthetic, general surgery, GP surgery type of thing—are very much based on the idea that if I went and tried to do ENT surgery, I’d never really be able to be in the country. And I’m not a big fan of GP work because I don’t like to sit down for most of my day. But part of what I’m trying to do is find a specialty that would allow me to live in the country. (I04; Male; PGY3)”</i> - Uncertainty about the future of rural GP anaesthetic model, whether this could hinder their future hospital work <i>“I’ve deliberately ruled out doing GP anaesthetics or GP obstetrics because I’m not sure of the future viability of those in the areas where I want to live and work. So I think just trying to read what’s going to be filled by all the huge numbers of doctors coming through that are going to fill specialist positions and then where the role of the GP is actually going and what we still be required to do to fill and where. (I08; Female; PGY3)”</i>	- Perception of training and working opportunities strongly influenced career choices among all junior doctors, independently of their specialty and practice location intention. There is only a rural generalist pathway available for doctors who want to stay in rural workplaces, and this frustrate interns who have non-GP intention. <i>“I actually find it very disappointing after working in rural areas and wanting to go back to those areas so badly, that unless you specifically want to be that rural GP, there’s firstly no pathway. And two, it’s not only not encouraged, it’s almost frowned upon. I find it amasing because the whole time I was in rural areas people talk about how much they’re trying to bring people rurally. When I look at it I kind of see a lot of closed doors. (I19; Male; FGY1)”</i>

		<i>“I think the biggest thing for making people who want to live rurally stay is giving them the opportunity to do their specialty training programs in a rural area. Because the longer you stay somewhere, the more likely you’ll stay. But it doesn’t really help for people to stay in a country area for internship and residency if they can’t be a registrar and stay there long term. (I11; Female; PGY2)”</i>
Harris 2020 UK / FY2 / Specialty choice – GP CASP 19 (relationship) / Key		
Rizan 2019 UK / FY2 / Not going into specialty training CASP 18 (relationship) / Key	- Taking a F3 as concern over not competitive enough portfolio and the F3 years can build their CV to make them more competitive in the future	
Appleton 2017 UK / Psychiatry trainee / Specialty choice – psychiatry CASP 20 / Key		
Essa 2010 SA / Doctors / General CASP 17 (recruitment, relationship) / Key		- Despite not enjoying working in the public sector, but having the desire to specialize further
Croghan 2020 Ireland / Intern / Specialty choice CASP 16 (relationship, ethics, analysis, finding) / Satisfactory	- Picking a specialty strategically based on growing need, seeing senior doctors encounter a lack of job opportunities and disillusioned by this. However not seem like a strong influence. Interns stating ‘at the end of the day I’d mostly just [follow my] interest’ (Richard), or that it would be ‘too difficult to forecast [job openings] anyway, really’ (James).	
Firth 2011 UK / FY2 / Specialty choice – GP CASP 16 (design, relationship, valuable) / Satisfactory		
Liang 2019 Australia and NZ / Women leaving surgical training / others CASP 19 (statement) / Satisfactory		

Appendix 22. CERQual evidence profile for meta-ethnography

Category	Summary	Assessment of methodological limitations	Assessment of coherence	Assessment of adequacy	Assessment of relevance	Overall CERQual assessment of confidence	Explanation of judgement
The “hand-on” experience and “real life” exposure	Interns may or may not have an intention or interest during medical school and this could be either re-enforced or changed dramatically during internship. The “hand-on”, “real-life” exposure to clinical practice and different specialties make some realize they enjoy it, or in some other cases, they do not enjoy working with certain patients, there are unexpected responsibility with some specialties, or they don’t even want to continue practice medicine, as being a student and being a doctor has significantly different level of responsibility. The comparison between different rotations also helps interns decide which specialty fit them best.	Minor methodological concerns (not clear in a number of studies whether the relationship between the researcher and participants was adequately considered; in another few studies the recruitment and analysis processes were not clearly described)	No or very minor concerns	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the recruitment and analysis processes were not clearly described
Positive experience, confidence and readiness	After successfully managing patients in different rotations, interns may feel confident and ready to further develop skills in certain specialty and sometimes with supportive consultants and team they rebuild previously damaged confidence; or on the contrary, negative experiences with lack of support could lead to interns feeling uncomfortable, losing confidence and not ready to further continue practicing or enter specialised training.	No or very minor methodological concerns (not clear in a few studies whether the relationship between the researcher and participants was adequately considered)	No or very minor concerns	No or very minor concerns	Moderate concerns (all reported from HIC, no LMIC data)	Moderate confidence	Very minor methodological concerns on relationship between the researcher and participants in a few studies, moderate concerns regarding relevance as all reported from HIC and no LMIC data
The workload, work-life balance, lifestyle	Interns prefer more manageable workload and healthier work-life balance. During internship, they may experience or observe the actual workload/lifestyle of different specialties, which the actual situation might be different than what they expect (e.g. GPs	Minor methodological concerns (not clear in a number of studies whether the relationship	Minor concerns (all studies reported the importance of work-life	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and

	also work stressful and long hours). Interns will choose careers (specialties, country of work) that fit their preferred lifestyles (some can also sacrifice) and whether it will be compatible with their future personal life of e.g. having a family and children, which also has a gender aspect to it.	between the researcher and participants was adequately considered; in another few studies the analysis processes were not clearly described)	balance though one paper also reported it's less important)				in another few studies the analysis processes were not clearly described; and minor concerns regarding coherence.
Well-being, emotional stress and the need to step off	Internship training is stressful, exhaustive, and sometimes also lonely, especially in certain rotations. Interns feel like they are on a "conveyor belt" or "treadmill" all the time, and will prefer careers that they can bear, and in some situations "step off" and take time out of training to alleviate their stress and exhaustion.	No or very minor methodological concerns (not clear in a few studies whether the relationship between the researcher and participants was adequately considered)	No or very minor concerns	No or very minor concerns	Moderate concerns (all reported from HIC, the one paper from South Africa did not explicitly relate this with career decision/intention)	Moderate confidence	Moderate concerns on relevance as all reported from HIC, the one paper from South Africa did not explicitly relate this with career decision/intention
Image of professions and self-identity	There are public and social status, respect and characteristics linked with certain specialties that are being reminded to doctors and also during internship. Interns may find this time to reflect and think whether their proposed career fit their self-identity, whether choosing certain specialty will make them being considered as "not a proper doctor". This is also linked with the hierarchy of career options and specialties.	No or very minor methodological concerns (not clear in a few studies whether the relationship between the researcher and participants was adequately considered)	No or very minor concerns	Serious concerns (3 studies offered thin data and 4 studies offered very thin data)	Serious concerns (all studies reported specialty choices only, not clear if it is directly relevant to internship experience; all studies from HIC, no LMIC data)	Very low confidence	Serious concerns on adequacy as studies only offered thin or very thin data; serious concerns on relevance as all studies reported specialty choices only, not clear if it is directly relevant to internship experience and that all studies from HIC, no LMIC data
Relationship with supervisors/consultants	Consultants and supervisors are very influential in interns' career choices. Enthusiastic and supportive supervisors could be mentors, role models, giving career advice (even lobbying) and interns will "want to be like him/her". In some other cases, there	Minor methodological concerns (not clear in a number of studies whether the relationship	No or very minor concerns	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and

	could be insufficient or no role models, or poor ones that bully interns, do not adequately support interns of their practice and career choices, or performing poor clinical practices and interns will “not want to become such doctor”.	between the researcher and participants was adequately considered; in another few studies the recruitment and analysis processes were not clearly described)					in another few studies the recruitment and analysis processes were not clearly described
Relationship with peers	Peers are important social relationship during internship training that can support each other. Interns make career decisions based on the information sometimes generated from peer networks, and interns may want to make choices that are “validated” by their peers and follow others’ recommendation or what everyone else are doing. Interns may also want to continue working in certain locations or specialties because they want to maintain established personal relationship. However, there are also competition between peers, such competition and “elbowing one’s way into the theatre” may deter interns’ interest into certain career, and some may decide to leave so that there could be less competition for their peers.	Minor methodological concerns (not clear in a number of studies whether the relationship between the researcher and participants was adequately considered; in another few studies the some other aspects were not clearly described)	No or very minor concerns	No or very minor concerns	Minor concerns (most reported from HIC, one LMIC data)	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies some other aspects were not clearly described; minor concerns regarding relevance as most but one paper are from HIC
Relationship with senior colleagues and the team	Other senior colleagues and the healthcare team are also key to career decision-making. Interns prefer teams that are supportive, friendly, approachable, feeling welcomed and valued, and demonstrate similar characteristics – and reject ones that are unsupportive. Interns also could seek advice from other colleagues like specialties trainee to get more familiar with working practices and training requirement, or sometimes just “witnessing registrar that are broken” and therefore shift career plans.	Minor methodological concerns (not clear in a number of studies whether the relationship between the researcher and participants was adequately considered; in another few studies the recruitment, ethics and analysis	No or very minor concerns	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns on relationship between the researcher and participants in a number of studies, and in another few studies the recruitment, ethics and analysis processes were not clearly described

		processes were not clearly described)					
Relationship with patient and the community	Through working with patients and the community, interns may realize if they like such interaction, interns may also feel like they are integrated to the community and want to continue serving the community that decided their career choices.	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis processes were not clearly described)	No or very minor concerns	Minor concerns (3 studies offered moderately rich data, 2 offered thin data and 1 very thin data)	Minor concerns (most reported from HIC, one LMIC data)	Moderate concerns	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns on adequacy as studies offered moderately rich to very thin data; minor concerns regarding relevance as most but one paper are from HIC
Characteristics and hierarchy of career options and specialties	There are said and unsaid characteristics and hierarchy of different career choices and specialties. Interns constantly hear consultants, senior colleagues or their peers commenting or bashing on some specialties like “just a GP” or “not worthwhile” or some specialties being more gendered e.g. surgery being a male-dominated specialty and females are discouraged from it. Interns sometimes even say this among themselves or have to hide their preferred intention for future career. This inevitably influenced interns’ career decisions. However, not everyone is affected by this (ref 167).	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis processes were not clearly described)	Minor concerns (all studies reported that the hierarchy impacted their decision-making though one paper also reported quotes that suggest it is not important and they won’t be impacted)	No or very minor concerns	Moderate concerns (all studies reported specialty choices only, not clear if this will be relevant to other career options; most reported from HIC, one LMIC data)	Moderate confidence	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns on coherence; moderate concerns regarding relevance as all studies reported specialty choices only, not clear if this will be relevant to other career options and most reported from HIC, one LMIC data
Workplace location, condition, resources and environment	Interns are also drawn towards workplaces that have good facilities and resources, supportive environment, and high morale.	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis	No or very minor concerns	Moderate concern (1 study offered moderately rich data, 1	No or very minor concerns	Moderate concerns	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described;

		processes were not clearly described)		thin data and 4 very thin data)			minor concerns on adequacy as studies offered moderately rich to very thin data
Feeling valued by the organization and healthcare system	Interns sometimes feeling undervalued and under-appreciated by the organization and the healthcare system. They felt they are considered as “cheap labour” for service provision. They are sometimes frustrated by the administration that lack accountability, does not care about their wellbeing, and consider interns as hassle if they raise concern. Therefore interns may consider choosing other work organizations (private sector, another country) for their future career.	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis processes were not clearly described)	No or very minor concerns	No or very minor concerns	Minor concerns (most reported from HIC, one LMIC data)	High confidence	Minor methodological concerns as in a few studies the design, recruitment, ethics and analysis processes were not clearly described; minor concerns regarding relevance as most but one paper are from HIC
Job market polices and changes, job security: will I get a job	The job market polices for example changes to junior doctor contract, government cost-cutting are felt even closer during internship period, this will lead to interns choosing specialties that are more employable in the future or workplaces that have more certainty. However, it’s not always a strong influencer and sometimes it’s hard to predict (ref 144).	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis processes were not clearly described)	Minor concerns (all studies reported the importance of future job opportunities, though one paper said it’s not strong influence as future is hard to predict)	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns as in another few studies the recruitment, ethics and analysis processes were not clearly described; and minor concerns on coherence
Future training and professional development opportunities: will I get advanced	Interns will choose career options that will allow their future training and professional development, based on what they experience with the healthcare team and what they hear about in other settings. Interns won’t choose pathways that limit personal development, or jobs that are low-quality and “no one else want”.	Minor methodological concerns (in a few studies the design, recruitment, ethics and analysis processes were not clearly described)	No or very minor concerns	No or very minor concerns	No or very minor concerns	High confidence	Only minor methodological concerns as in another few studies the recruitment, ethics and analysis processes were not clearly described

Appendix 23. Comparing results from the meta-ethnography and Kenya interviews with MOs and consultants

Category	Meta-ethnography	Similarity and difference with Kenya data	Quotes
The “hand-on” experience and “real life” exposure	Interns may or may not have an intention or interest during medical school and this could be either re-enforced or changed dramatically during internship. The “hand-on”, “real-life” exposure to clinical practice and different specialties make some realize they enjoy it, or in some other cases, they do not enjoy working with certain patients, there are unexpected responsibility with some specialties, or they don’t even want to continue practice medicine, as being a student and being a doctor has significantly different level of responsibility. The comparison between different rotations also helps interns decide which specialty fit them best.	Similarly, interns’ interests could be cemented during internship when they enjoy certain rotations or sometimes made them realize “not for me”. CMEs was also mentioned as one source of exposure.	<i>M24 (L5 – Public – Public MO)</i> After when I started my internship, I started with int Med yeah. And of course I was excited about it 'cause I was like, I could actually practice how I could become a physician in future. But after I think, like I said, week 6-7 I actually got bored because I realised unless something new happens, it's the same thing every day, over and over again and I just lost interest after a while. Then I went to pediatrics after that. Again, after a while I got bored because, I don't know. It was also the same same thing every day. Then I went to obstetrics and I never actually thought I would enjoy obstetrics. But I did. And that’s actually what I’m going to practice in future. So, that's where that's where I am at right now. I am passionate about it. I enjoy it every day. I actually don't mind doing it. And also in line with my other passions. You know family planning, contraception use, early pregnancies, so it just it. I don't know, it just worked out in that in that direction. I think I don't want to comment about surgery because I don't think I had a good feel of surgery. Like I said, because of COVID.
Positive experience, confidence and readiness	After successfully managing patients in different rotations, interns may feel confident and ready to further develop skills in certain specialty and sometimes with supportive consultants and team they rebuild previously damaged confidence; or on the contrary, negative experiences with lack	Similarly, good experiences in certain rotations draw interns’ interest towards that specialty while bad experiences turn people off. In addition to the review findings, in some cases interns may not get enough experience or exposure in certain areas thus want to fill those gaps and get more exposure post-internship	<i>C05 (L5 – Public – Surgery)</i> And also some of the things which they also tend to, to move which they which they used to choose their direction, is their strengths. There are some who are very, very good in theater. So you find that when a county announces for employment and they say that these young guys will go to maternity, some will withdraw and say they were not good in doing CS and they are not comfortable in doing CS, they don't want to be CSs and they will drop, the ones who are comfortable will actually go for that

	of support could lead to interns feeling uncomfortable, losing confidence and not ready to further continue practicing or enter specialised training.		employment. So I think also strengths and weaknesses tend to influence how they will go. <i>M02 (L5 – Public – Public MO)</i> I had wanted to major in surgery because I feel like it really not exhausted my potential during my internship at the surgery department, so I wanted to start with surgery so that I can learn as much as I can but that was not possible then.
The workload, work-life balance, lifestyle	Interns prefer more manageable workload and healthier work-life balance. During internship, they may experience or observe the actual workload/lifestyle of different specialties, which the actual situation might be different than what they expect (e.g. GPs also work stressful and long hours). Interns will choose careers (specialties, country of work) that fit their preferred lifestyles (some can also sacrifice) and whether it will be compatible with their future personal life of e.g. having a family and children, which also has a gender aspect to it.	Similarly, interns prefer more manageable workload and work-life balance which reflect in different specialty choices – from their own experiences or observations of their senior colleagues. <i>However, there is also a difference in workload between public and private hospitals which influence people's choices.</i>	<i>M13 (L5 – Public – Public MO)</i> I think I had a feeling that practice was not for me during med school, but I, of course when you're in school, you really don't have a very clear idea of what the outside world is and what your opinions of this were....But when I came for internship is when I confirmed that for sure this wasn't for me, uh... So it would not be totally true for me to say that it is internship that changed my mind, but it really confirmed that it wasn't for me, especially the workload at a public hospital that is so big. You, it really confirmed it and it made me certain I absolutely do not want it. <i>M16 (L5 – Public – Public MO)</i> I wanted a public hospital because one when you compare the workload in private to the one in public, private is, okay from my experience, private it has a lot of, it has a heavy workload. So public is always my better option.
Well-being, emotional stress and the need to step off	Internship training is stressful, exhaustive, and sometimes also lonely, especially in certain rotations. Interns feel like they are on a “conveyor belt” or “treadmill” all the time, and will prefer careers that they can bear, and in some situations “step off” and take time out of training to	Similar with the review findings, interns would choose to “take a break” after internship because of their internship experience was really stressful (M30 who chose to work in business). <i>One additional finding is that some specialties were also described as very stressful and “living on the</i>	<i>M08 (L4 – Private – Private MO)</i> For right now I know based on how my obstetrics rotation went. I mean, it was great and everything...great mentorship, I learned a lot but I don't think I'm really cut out for that life. You know, living on the edge being alert on call at any point, I know it's not, it's not the life I want. I mean, I want to be able to, I know this is the weekend, patients are stable. Yeah, I can sit back and relax. Nobody's going to have, you know, premature rupture of membranes at

	alleviate their stress and exhaustion.	edge” which turned people off.	3am in the night. You know, things like that. Like different internship I know now, that's not my kind of environment. So that one is out for me. I know and I okay, now based on internship and maybe what I'm doing currently. I normally empathetic, I used to love oncology I think am cut out for that line of work. Yeah, it really shaped me...
Image of professions and self-identity	There are public and social status, respect and characteristics linked with certain specialties that are being reminded to doctors and also during internship. Interns may find this time to reflect and think whether their proposed career fit their self-identity, whether choosing certain specialty will make them being considered as “not a proper doctor”. This is also linked with the hierarchy of career options and specialties.	While professional image and self-identify are similar between the review findings and the Kenya data, what's new from the Kenya data is some specialties were considered for other lower cadres thus “not for doctors”. However, in both cases this is the weakest category and not supported by adequate data.	<i>M20 (L4 – Public – Mission MO)</i> Well just a general feeling, not really from my supervisors or anything. But I don't know, guys don't like doing anaesthesia. Yeah, they feel that there is no work for them, they only work in ICUs, you know there was a course that was introduced, it is for clinical officers. So they specialize in anaesthesia and then nursing, nurses can also do, become an anaesthesia nurses. So these days, most of the work is done by the clinicians. And for you to get employed as an anaesthesiologist it is not that easy and most of the other medical officers they say, quote and quote the feeling is the, they say lazy or something people don't like to read.
Relationship with supervisors/consultants	Consultants and supervisors are very influential in interns' career choices. Enthusiastic and supportive supervisors could be mentors, role models, giving career advice (even lobbying) and interns will “want to be like him/her”. In some other cases, there could be insufficient or no role models, or poor ones that bully interns, do not adequately support interns of their practice and career choices, or performing poor clinical practices and	Similarly, this category is considered the most important one with lots of data. Interns receive encouragement, mentorship, career advice from their consultants and “want to be like them”, or witness “bad” examples (e.g. no professionalism) or bullying thus changed their career intentions. It should be noted not all respondents say it made a difference. Two additional findings from the Kenya data are: (1) Interns may witness “successful” consultants and “struggling” ones which will affect their intentions. While this come up in the review for	<i>M08 (L4 – Private – Private MO)</i> But then when I transfer transition to internal medicine, it was it was a hell. I was first of all, racially profiled. Yes, I was racially profiled and at some point, it almost generated to physical abuse. I had a file flung at my face. That's story for another day. So what end up happening, in as much as I loved internal medicine, I knew I deep down wanted to be a physician. Those four months actually five 'cause I did the three months and then they added me an extra two months maybe for working for people for free. But those last four months were torture. I left [Hospital N] knowing I will never, ever, ever touch internal medicine again, because I didn't want to be liked to those two bullies.

	interns will “not want to become such doctor”.	“relationship with senior colleagues” it wasn’t mentioned much from supervisors. (2) Interns who perform well could directly secure locumming opportunities from their supervisors.	<i>M11 (L4 – Public – Public MO)</i> My interaction with my consultants and my, really...it did because one, I will- First, of all, let me just say that money is normally a very powerful incentive for anything. So some of my lecturers, my undergraduate years seemed to be living very comfortable lives for example...Another example of a successful radiologist is another one who I also interacted with very closely. He was not my lecturer, but we interacted with him in the ward, extracurricular life. He is called Dr. [Name]. He’s also very, you know, financially comfortable. So that is one of the, that was one of the, that one to be honest, also inspired a lot of interest on my side.
Relationship with peers	Peers are important social relationship during internship training that can support each other. Interns make career decisions based on the information sometimes generated from peer networks, and interns may want to make choices that are “validated” by their peers and follow others’ recommendation or what everyone else are doing. Interns may also want to continue working in certain locations or specialties because they want to maintain established personal relationship. However, there are also competition between peers, such competition and “elbowing one’s way into the theatre” may deter interns’ interest into certain career, and some	While the Kenya data also suggested that interns talk to peers to understand and share working experiences in different hospitals and potential job opportunities, we did not identify any data relating to “validation” by peers, maintaining “personal relationship” or competition with peers.	<i>M10 (L5 – Public – Private MO)</i> By the way we lack as Kenyan, I can say as a Kenyan intern at that time, without colleagues coming from outside, who had studied abroad, we were very few and only goes to centers that are very close to the city, you may lack to get experience of outside Kenya. So I can say I was lucky I was at a center that was close to Nairobi and I received colleagues that I trained outside the city- outside the country, so they influenced me to think about other things out of medicine. Things go badly you can even venture into online jobs you know. They had their own connection there, so I can say they have really influenced me to survive out here. They haven’t influenced me to what major on what I will do out there, but surviving without an employment.

	may decide to leave so that there could be less competition for their peers.		
Relationship with senior colleagues and the team	Other senior colleagues and the healthcare team are also key to career decision-making. Interns prefer teams that are supportive, friendly, approachable, feeling welcomed and valued, and demonstrate similar characteristics – and reject ones that are unsupportive. Interns also could seek advice from other colleagues like specialties trainee to get more familiar with working practices and training requirement, or sometimes just “witnessing registrar that are broken” and therefore shift career plans.	Similar with the review findings, interns draw experience from senior colleagues who may be immediate past interns and seek job opportunities. Interns also mentioned nurses being inspiring for their career intention. Registrars were not mentioned in our data which might be due to different training systems in Kenya (registrars tend to work in a very few L6 hospitals).	<i>M12 (L4 – Public – Private MO)</i> Let me say this, I might be biased, but the best time I ever had was, within maternity ward had nurses who were there who were very hard working and they taught me a lot of things even as an intern, as a medical officer and I can never take that away from them. Of course, you know, if you work in such an environment, you'll also find nurses who would prefer for you to rush a patient towards CS, rather than you know follow up the patient and check them up, but with maternity, they were very hardworking nurses, very, like, they are ready to teach. But in pediatrics, the nurses were the same, ready to help, ready to teach, so, that's also like jolted me to wanting to pursue a career in pediatrics.
Relationship with patient and the community	Through working with patients and the community, interns may realize if they like such interaction, interns may also feel like they are integrated to the community and want to continue serving the community that decided their career choices.	Similar with the review findings, interns may decide on their career intention based on experiences interacting with patients or witnessing the needs of the patients.	<i>M12 (L4 – Public – Private MO)</i> Okay, so for me, I had a choice between internal medicine, obstetrics, gynecology and pediatrics. What I realised for me, I'm driven more into to pediatrics because parents listen, parents really take care of their children, the staff at the pediatric ward were very responsive to any complaints rather than the dismisses complaints in the medical wards or in the surgical wards.
Characteristics and hierarchy of career options and specialties	There are said and unsaid characteristics and hierarchy of different career choices and specialties. Interns constantly hear consultants, senior colleagues or their peers commenting or bashing on some	Similarly, certain career choices and specialty would be looked down upon or associated with certain characteristic: for example working in research is acceptable but all other options outside of clinical practices are not; ophthalmology is considered for women,	<i>M30 (L4 – Mission – Business)</i> because we were the first lot that had the mandatory psychiatry rotation in internship, but then just from the onset, coordinator, who's a surgeon just told us like that's not really going to happen. “I'm not going to give you time to rotate in psychiatry” ... For us we were told like we'll only do Friday psychiatry clinics, outpatient, with the family

	specialties like “just a GP” or “not worthwhile” or some specialties being more gendered e.g. surgery being a male-dominated specialty and females are discouraged from it. Interns sometimes even say this among themselves or have to hide their preferred intention for future career. This inevitably influenced interns’ career decisions. However, not everyone is affected by this (ref 167).	neurosurgery and orthopaedics for men; psychiatry being looked down upon. What’s new is that this not only leads to certain specialties being less appealing, but also leads to lead interns are less exposed to different specialties from the start.	medicine consultant, and that was final, no discussion! And then we're also told that, you know, let's like forget about the community health rotation which some of us had great interest in and, you know, it was just like since they're not really entirely hands on, entirely clinical, entirely hospital based, areas of interest, then it's not important, you know, you're supposed to be a clinician... So we actually had one of us that was really interested in psychiatry and she was really, she was really sad about it, because every time we raised the issue, you know, she was just shut down continuously every time she tried to talk about it and say, you know, some of us have an interest in psychiatry. It was sort of belittled like almost made fun of...
Workplace location, condition, resources and environment	Interns are also drawn towards workplaces that have good facilities and resources, supportive environment, and high morale.	This came up quite prominently in the Kenya data. Similar with the review findings, interns are drawn towards well-managed facilities with adequate resources and less bureaucracy. What’s new are: (1) Interns prefer to work in the same facility after internship because they are familiar with the setting which also make them more competitive when applying for jobs; (2) Interns will consider what the internship hospitals are good at (e.g. which specialty) and use that to cultivate their career interest.	<i>M11 (L4 – Public – Public MO)</i> Going into internship, I had an ideal place where I would have loved to work. But after internship, I realised that my internship centre was not that ideal place. So I perhaps, I would have wished to work at a private facility, a facility such as [Hospital L], where I would have the support of all these all be working departments and functional units. But I think the biggest impact that internship had on me was that I would have wished to...to make where I did my internship a better place. I would have wished to inject my energies. <i>M13 (L5 – Public – Public MO)</i> Number two, when you worked or done internship in a county, you want to go, when it comes to hiring, you have an advantage because now in the panel you can just explain to them that I was here, I have worked here, I know the doctors and I want to remain here and serve the community. And easier sell compared to someone who was because they feel that you were trained by their doctor or hospital, so you tend to do better. <i>M29 (L5 – Military – Research)</i>

			And so the hospital I worked at had a very good mental health department so I was also drawn to considering pursuing mental health so maybe psychiatry. Then they also were really good with research although you know with the military they don't publish any research findings because of national security, so at least it also pushed me towards the path I'm in right now.
Feeling valued by the organization and healthcare system	Interns sometimes feeling undervalued and under-appreciated by the organization and the healthcare system. They felt they are considered as "cheap labour" for service provision. They are sometimes frustrated by the administration that lack accountability, does not care about their wellbeing, and consider interns as hassle if they raise concern. Therefore interns may consider choosing other work organizations (private sector, another country) for their future career.	Similar with the review findings, interns prefer to choose employers (sector/county) where they are supported and being valued.	<i>M11 (L4 – Public – Public MO)</i> Because one of the things that have been, especially in my county, I have seen it. I saw it before internship, during internship and even now that I am working there as an MO, serious salary delays, the serious salary delays are so bad but they have the effect of making it seem as though you know you miss...You miss salary for certain months. So, one of the considerations was, and it has been a very prominent consideration. We discussed it is not only among ourselves, but in the wider doctor community people who advocate for immigration for other countries to pursue your studies and your dream careers there. Or at the least working in the private sector.
NEW: Witnessing and filling health system gaps		This is a new area. Many MOs described witnessing the systematic challenges in the public health system during their internship including the NHIF, preventable mortality, referral, etc. thus wanting to pursue public health as a career. For another MO, s/he witnessed that the county is lacking in orthopaedic surgeon thus having an intention to specialize in that, which allowed him/her to benefit the people and him/herself.	<i>M04 (L5 – Mission – Public MO)</i> Just the patients and just what they have to go through, you know, like the way Kenya is set up, before a patient shows up at like [Hospital J] they have gone through several other cadres or hospitals lower. And there are so many patients that I ended up losing or just having to, that suffered complications simply because they didn't have ability to access good care from the forefront. And it was like almost every day for me. I remember a case of a police officer who showed up with stage four cancer, and yet he had been to facilities all through that could have caught that cancer, but it just kept being missed, and by the time he

			showed up, he was in stage four and he was just 35 years old. And that really bothered me because, one, he had ability to access that facility, they had the ability to access healthcare. So he accessed it, but wherever he accessed it, the facilities were not well equipped to make timely diagnosis. And there were so many of such stories in different forms. And for me I realised that yes, there are those who will play their role at this level 6 facilities, and there are those who need to play their role at the other level of healthcare cause, so for me, preventive medicine became important and crucial yeah, I think it's just the experiences I encountered.
Job market polices and changes, job security: will I get a job	The job market polices for example changes to junior doctor contract, government cost-cutting are felt even closer during internship period, this will lead to interns choosing specialties that are more employable in the future or workplaces that have more certainty. However, it's not always a strong influencer and sometimes it's hard to predict.	While junior doctor contract was not specifically mentioned, interns are concerned with decentralization, job security and which specialty seems more employable.	<i>M08 (L4 – Private – Private MO)</i> So even right now you're thinking, okay for example maybe I love, let's say I love psychiatry, but you're looking at it in terms of even after I struggle through will I have an income after? Am I employable? So it's, it's what has really shaped the decision. I know of so many people who are like really passionate, for example, about being physicians, but somebody tells you, 'okay, so become a physician and get out and then?' So they've wound up in things like obstetrics, they've wound up in things like EMT. Yeah, just 'cause of that, you know, thinking in the next five years, will I be employable? Will I have somewhere to have my footing? I have, I have a friend who finished surgery, and has been job hunting for the last six months. You go somewhere somebody tells you, we can't employ you because we can't afford to pay you and we can't employ you as a medical officer, I mean, you're overqualified.
Future training and professional development opportunities: will I get advanced	Interns will choose career options that will allow their future training and professional development, based on what they experience with the	Similarly, interns will choose places where they could get further advancement through training and working with consultants, where they are not "chronic MOs". As county governments are no	<i>M16 (L5 – Public – Public MO)</i> We don't know what will happen after the three years because there are some who after the three years they will get confirmation of permanent jobs and there are those who don't, so it depends with the county that you are in because

	healthcare team and what they hear about in other settings. Interns won't choose pathways that limit personal development, or jobs that are low-quality and "no one else want".	longer sponsoring MMed training, public sector seems less appealing as an option. Additionally, interns are more pragmatic and are leaning towards specialties that are easier to get into based on their experiences	there are some counties who convert from three year contract to PNP but basing on the fact that most of them are yet to have employees at their facility for more than three years, we do not know what will happen but it is pushing people away from doing, from been a chronic MO let me say a chronic MO.
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