Ensuring Progress on Sustainable Access to Effective Antibiotics at UNGA 2024: A Target-Based Approach

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Key Messages

The critical components of managing global common goods like antimicrobial effectiveness are political will, targets, accountability frameworks, and funding.

The 2nd High-Level Meeting (HLM) on Antimicrobial Resistance (AMR) at the United Nations General Assembly (UNGA) in September 2024 shows continued political interest in progressing global governance of AMR. Greater engagement by G77 and Global South leaders is needed.

We propose global targets, '10-20-30 by 2030,' relative to pre-pandemic 2019 levels. We propose to achieve, by 2030, a 10% reduction in deaths attributable to AMR, a 20% reduction in inappropriate antibiotic use in humans while ensuring universal access to essential antibiotics, and a 30% global reduction in inappropriate antibiotic use in animals.

We call for the establishment of an independent scientific body – an Independent Panel on Antimicrobial Access and Resistance – to expand the evidence base for policy implementation and to inform new targets.

We call for increased funding for infection prevention mitigation programmes in human health and food production in low- and middle-income countries, based on the modelled effects of such interventions on antibiotic use, one of the main drivers of AMR.

The UNGA AMR-HLM meeting is a recalibration opportunity with a long lens. It can inspire greater international cooperation, global governance, and momentum towards AMR mitigation while establishing the essential components for achieving long-term goals.

SUMMARY

Rising antimicrobial resistance (AMR) is a global health crisis for both rich and poor countries alongside a broader challenge of access to antibiotics. Development goals for child survival, healthy aging, poverty reduction, and food security are at risk. Preserving antimicrobial effectiveness, a global public good, requires political will, targets, accountability frameworks, and funding. The 2nd High Level Meeting on antimicrobial resistance at the United Nations General Assembly (UNGA) in 2024 is evidence of political interest in addressing the problem, but action on targets, accountability, and funding was absent in the 2016 UNGA resolution.

We propose ambitious yet achievable global targets for 2030: a 10% reduction in mortality from AMR, a 20% reduction in inappropriate human antibiotic use, and a 30% reduction in inappropriate animal antibiotic use. These '10-20-30 by 2030' goals should be met within a framework of universal access to effective antibiotics, given variation in current levels of antibiotic use. Some countries should increase access to "Access" antibiotics, which could have the effect of discouraging the inappropriate use of "Watch" and "Reserve" antibiotics. Improved infection prevention and control, water and sanitation, and vaccination coverage can offset the selection effects of increased antibiotic use in low-income settings. To ensure accountability and global scientific guidance and consensus, we call for the establishment of an Independent Panel on Antimicrobial Access and Resistance and the support of Global South leaders.

INTRODUCTION

In September 2024, the United Nations General Assembly (UNGA) turns its attention to the declining effectiveness of antibiotics for the second time at a high-level meeting (HLM). Several things have changed since the first High-Level Meeting in 2016 on antimicrobial resistance (AMR), which here refers to drug resistance in bacteria other than tuberculosis (an infection for which the Global Plan to STOP TB partnership has well-formulated plans and targets).

First, the global burden of AMR is now in sharper focus. In 2019, an estimated 7·7 million people died of infections associated with 33 bacterial pathogens, both resistant and susceptible.[1] Of the estimated 1·27 million deaths attributed to AMR in 2019, 1·12 million were in low- and middle-income countries (LMICs).[2] The deaths included more than 253,000 children under age five in LMICs and a total of 255,000 people in sub-Saharan Africa.[2]

Second, despite interventions, the burden of antibiotic use and resistance is higher today in most countries than in 2016. It was accelerated during the COVID-19 pandemic because of inappropriate treatment.[3] Human consumption is shifting from the narrow-spectrum "Access" drugs to the broad-spectrum "Watch" antibiotics,[4] many of which are inappropriate and potentiate resistance. Use in animals has risen as well.

Third, despite increased investment in new antibiotics, some infections remain untreatable. Public-private partnerships, such as the Global Antibiotic Research and Development Partnership (GARDP) and Combating Antibiotic-Resistant Bacteria (CARB-X), and private funding through the AMR Action Fund and the Repair Fund have encouraged companies to take novel entities through clinical testing to registration, but these efforts remain insufficient (see Paper 3[5]). Many antimicrobials under development do not address pathogens of greatest importance in LMICs, and many new antibiotics may never reach patients in need if they remain unregistered and unavailable. In high-income countries (HICs), the few patients with resistant bacterial infections receive expensive new antibiotics funded by healthcare systems; in LMICs, many patients cannot afford even existing antibiotics.[6]

UNGA, through its HLM, should work to mitigate AMR, for three reasons. First, antibiotic effectiveness is a global public good. The failure of one country to minimize the risk of resistance puts all countries at risk because resistant bacteria cross borders. Addressing some aspects of AMR – specifically of reducing inappropriate antibiotic use – is a collective action problem that requires the cooperation of patients, physicians, healthcare facilities, and political leaders. Other actions, including of investment in infection prevention and control (IPC), water and sanitation (WASH), and vaccinations benefit countries directly. An underappreciated aspect of the problem is the risk that unnecessary antibiotic use poses for patients. Social norms affect how antibiotics are used, and global guidance to reduce inappropriate use can help. Second, the UN's sustainable development goals for child and maternal survival, poverty, effective primary care, hunger, and food, agriculture, and aquaculture are at risk because of failing antibiotics.[7] Third, AMR is a One Health problem that cannot be addressed through a single vertical program but instead needs to be embedded across priorities in human, animal, plant, and environmental health, including vaccination, IPC, WASH, and antibiotic stewardship spanning human and animal use. This cross-sectoral action cannot be addressed by any single UN agency: it requires the United Nations itself.

Progress to ensuring sustainable access to effective antibiotics is underpinned by the principles of equity, in ensuring appropriate antibiotic access for all countries. This is best achieved by infection prevention to reduce infection burden and hence unnecessary antibiotic exposure, which drives AMR in humans and animals, and increasing manufacture and availability of existing antibiotics, and R&D for novel antibiotics, all of which eventually lead to sustainable sustain access.

METHODOLOGY

The expertise of the authors, who collectively have decades of experience in this field, have been synthesized here in an analytic commentary (based on a review of policy documents and historical and scientific knowledge) and original analysis (see **Supplementary Information**). This policy-driven paper, the capstone of the 2024 *Lancet* Series on AMR, aims to provide actionable, evidence-backed solutions to the AMR and sustainable global antibiotic access challenge.

SOLVING GLOBAL COMMONS PROBLEMS

In part, lack of international accountability in AMR relates to an absence of agreed targets. Without targets and subsequent monitoring and evaluation, it is difficult to track progress. Consider an older international challenge: atmospheric ozone depletion. The 1987 Montreal Protocol sought to reduce the production and use of certain chlorofluorocarbons and halons to 80% of 1986 levels by 1994 and 50% by 1999; it was later amended to completely phase out these emissions. The clear, action-oriented target served as a barometer of global progress and promoted a unified approach.[8]

Other efforts to manage global commons are the Millennium Development Goal to reduce child mortality and the Sustainable Development Goal (SDG) that calls for ending the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases. Each has four elements: political will, targets, accountability frameworks, and funding.[9] AMR already has political support, given the implementation of several recommendations from the first HLM, its prominence in G7 and G20 communiques, and the upcoming second HLM at UNGA. However, the last three elements are lacking. In this paper, we discuss attainable targets, accountability, and funding to address AMR.

Antibiotic use can influence the rate of increase of AMR.[10–13] Overuse of antibiotics occurs in some parts of the world, too little use in others. As the previous *Lancet* Series on AMR made clear, lack of antibiotics still kills many; indeed, some of the burden of childhood mortality in sub-Saharan Africa reflects this access gap. Patients dying of AMR in these countries simply would not die if they lived in a higher-income country where alternative antibiotics would be available.

Clear targets for optimal antibiotic use will help drive the development, funding, and implementation of national action plans (NAPs). Detailed target setting at a national level will require additional evidence and consultation with an Independent Panel on Antimicrobial Access and Resistance (IPAAR) (see **Panel 1**). National targets for optimal antimicrobial use (AMU) – the right drug for the right patient at the right time will differ, depending on burden of infection, AMR, and public health priorities. HICs with lower disease burden generally use more antibiotics than LMICs (**Figure 1** and **SI pg 5**) and need to further curb excess use through increased stewardship activities in both hospital and community settings. The AWaRe Book (See Paper 1,[20] Panel 1) provides an excellent starting point, particularly for community-based prescribing. This, too, provides a pathway for increased stewardship in LMICs, although implementation in communities that lack clinicians may depend on training the available healthcare workers.

Tackling AMR requires coordinated action to reduce both the selection pressure for antibiotic-resistant bacterial pathogens (driven mainly by inappropriate antibiotic use) and the incidence of infections that require antibiotic treatment, primarily through infection prevention and control (IPC); water, sanitation, and hygiene (WASH) interventions; and vaccination. Targets for reducing infection burden need to reflect the higher mortality in vulnerable populations, including neonates, infants, and older people. Several countries have used targets to achieve goals for reducing AMR and AMU.[21,22]

PROPOSED TARGETS

From a 2019 (pre-COVID-19) baseline, we propose targets of 10-20-30 by 2030:

Target 1: 10% global reduction in deaths attributable to AMR.

Target 2: 20% global reduction in inappropriate antibiotic use in humans, with universal availability of Access antibiotics

Target 3: 30% global reduction in inappropriate antibiotic use in animals.

The targets balance aspiration and feasibility in countries of differing socioeconomic status. They were chosen because they are achievable through scaling up available interventions (see Paper 2[23]). Furthermore, despite the challenges of determining appropriate use (see **Panel 2**), they are largely measurable and would allow individual states to prioritise interventions according to available evidence and resources.

Targets for optimal AMU will differ with countries' baseline levels of use of AWaRe antibiotics and public health needs. Below, we describe sub-targets for access to essential antibiotics. Targets are also needed for outcome measures of resistance, numbers of resistant or untreatable infections, AMU across AWaRe categories, and prevention measures to reduce the need for antibiotics. Finally, quality metrics for development of, and sustainable access to, novel antibiotics to treat currently untreatable bacterial infections are required.

1. Achieving 10% global reduction in AMR deaths

Any bacterial infection, whether resistant or susceptible, that necessitates antibiotic treatment contributes to the AMR problem. A reduction in AMR deaths requires investments in health systems, IPC, WASH, vaccination, and antibiotic stewardship. Public health interventions vary with a country's politics, governance, and economic status. Some countries, predominantly in the Global North, that have reduced the burden of infectious disease have therefore reduced overall antibiotic use. In the Global South, reducing the massive burden of infectious disease is the first step in reducing both antibiotic consumption and resistance.[6,12,25]

NAPs to mitigate AMR comprise costly efforts in infection prevention (mainly in healthcare settings), surveillance, stewardship, awareness and education, and research and development (R&D). Understanding which interventions are most cost-effective for a country or region is critical for setting local priorities.

In Paper 2 of this series, we estimated how infection prevention would affect AMR-associated mortality, morbidity, AMR, and AMU in LMICs of differing socioeconomic and development status.[23] Scaling up healthcare IPC, WASH, and childhood vaccination programmes would reduce both overall infection-related and AMR-associated mortality and morbidity. These measures stand to benefit low-income countries the most, although HICs would also benefit from greater adherence to IPC measures. Significant (albeit diminishing) returns are expected for lower-middle- and upper-middle-income countries, where persistent gaps in IPC, WASH, and vaccination drive preventable infectious disease mortality. Because these interventions reduce the total burden of disease, as well as prevent AMR-associated deaths, investment in their universal application has wide benefits for human well-being.

The required interventions are already in our toolkit. Implementing IPC in more healthcare facilities—such that an additional 20% of providers reliably practice hand hygiene—could achieve more than half the mortality target alone, preventing 6·2% (95% confidence interval: 4·4–8·6%) of all AMR-associated mortality in LMICs (**Figure 2**). In low-income countries, universal access to high-quality WASH services[26] by 2030 (SDG 6) would prevent 12·6% (7·8–17·4%) of AMR-associated mortality. Meeting these IPC and WASH targets plus achieving universal coverage of conjugate vaccines (for pneumococcus, *Haemophilus influenzae* type b (Hib), and typhoid), oral rotavirus vaccines, and influenza vaccines (in upper-middle-income countries could) could prevent 14·2% (11·4–17·4%) of AMR-associated mortality across all LMICs (**Figure 2**).

Evidence for the benefits of antibiotic stewardship, particularly in LMICs, is scarce, however. That the total preventable burden from IPC, WASH, and vaccination interventions represents only ~18% of the estimated AMR-associated deaths in LMICs (see Paper 2[23]) underscores the need to evaluate all strategies.

2. Achieving 20% global reduction in inappropriate human AMU

Achieving the first target opens a viable path to the second by reducing use of antibiotics for mild respiratory infections that generally do not require antibiotics. Because children transmit many resistant pathogens and experience the highest rates of AMU, interventions that prevent antibiotic-treated illnesses among children would help mitigate AMR selection. In the lowest-income countries, where poor water and sanitation cause many preventable infections,[29,30] achieving the SDG 6 target of universal WASH coverage would reduce the need for AMU by 24·6% (17·2–29·9%) among children (**Figure 3**).

Although not historically prioritised in LMICs because of its lower burden of childhood mortality, compared with other respiratory pathogens,[31] influenza vaccination alone is expected to prevent 9·4% (7·4–11·3%) of paediatric AMU in LMICs: it would prevent acute respiratory infections that precipitate large volumes of antibiotic treatment (see Paper 2[23]). Achieving universal coverage with pneumococcal, Hib, rotavirus and influenza vaccines would reduce paediatric antibiotic use by 14·1% (10·8–17·3%) in LMICs. Vaccines in early stages of implementation (e.g., respiratory syncytial virus) or late stages of development (e.g., *Shigella*) may offer still more benefits.

Universal vaccination coverage has a more central role in reducing AMU in middle-income and high-income countries with improved WASH. An equity approach to the development of global antibiotic targets recognizes that for many HICs with low disease burden, lower total use may be appropriate and more equitable. For many LMICs, however, the converse is true, and total use (burden-adjusted) may be higher than current use. Therefore, a global goal of reducing AMU must be implemented carefully.

To derive appropriate total antibiotic use targets, we estimated country-specific antibiotic use in defined daily doses (DDD) / 1000 inhabitants / day (DID) under several scenarios using 2018 baseline antibiotic use and infection incidence data from the Global Burden of Disease Study.[32,33] We defined two benchmark HICs and LMICs (**SI pg 2–4**) based on low DID with low infection mortality (<40/100,000) and used them as the minimum DID needed in a country at each income level (HIC = 10·8 DID and LMIC = 14.9 DID). These benchmarks set targets for improving access to essential antibiotics, particularly in low-income and lower-middle-income countries, to reduce mortality in countries with high infection burden (**SI pg 5**).

Under different scenarios (accounting for country-specific infection incidence and implementation of WASH and vaccination) for expanding access to antibiotics in LMICs while reducing unnecessary

antibiotic use in HICs, global estimates (Supplementary Information pg 6–7) mask a "redistribution" of antibiotics from predominantly HICs that are using more antibiotics than may be necessary, ensuring that countries have fair levels of antibiotic use (**SI pg 6**). By income group, the largest decreases in expected antibiotic use are in HICs for all scenarios (**Figure 4**) highlighting potential reductions up to 76%; in LMICs, most countries would be expected to increase antibiotic use to fair levels, with a median increase of 37% (maximum 247%).

Goal 2a. Universal availability of essential Access antibiotics in primary-care settings
Efforts to address inequities should ensure that vulnerable populations—mostly people in LMICs but also high-risk patients in HICs—have access to safe, effective, and affordable antibiotics (a component of SDG 3·8). Inequities within countries—lack of access in rural settings vs. excessive use in urban areas—is another challenge.

The recently published WHO Essential Medicines List AWaRe Book provides detailed guidance on using the 41 antibiotics on the 2023 EML/c, but more than 250 antibiotics are used globally in humans.[4] This goal focuses on the need to improve access to Access antibiotics by defining the key essential antibiotics that should be universally available in a safe, effective, and affordable formulation (SDG 3.8). Consideration should be given to its inclusion in the UHC Service Coverage Index.

About 90% of antibiotics are oral and administered in primary-care settings where rates of AMR are generally low. The WHO AWaRe Book recommends amoxicillin (+/– clavulanate) for 10 of the 12 common primary-care infections. High rates of Watch antibiotic use are seen in some HICs and LMICs; other countries already have high levels of Access antibiotic use (**SI pg 9**).

Goal 2b. Country-agreed total and Access/Watch/Reserve risk-adjusted volumes of use
This goal relates to levelling up Access antibiotic use globally and reducing inappropriate use of Watch antibiotics (mostly given for mild respiratory tract infections). The WHO 13th Global Program of Work recommended that by 2023, 60% of total antibiotic use at a country level be Access antibiotics. The target was set to encourage adoption of the AWaRe system. Because of limited data to inform more ambitious policy decisions, the target is low: broad-spectrum Watch antibiotic use doubled even before COVID-19 drove inappropriate use even higher. The WHO AWaRe book suggests that around 80% of oral antibiotic use can be Access antibiotics.

Although relative targets can be helpful in countries with very limited data, setting absolute (rather than percentage) targets for national and global antibiotic use in DID is preferable because Access/Watch relative targets can be achieved in ways that would worsen the quality of prescribing (**SI pg 9**). For example, a higher relative Access target could be met by increasing the unnecessary use of Access antibiotics. The AWaRe Book provides clear guidance on a risk-based approach—a "no antibiotics" strategy for minor infections in low-risk patients.

Baseline targets for Watch antibiotics can be risk-adjusted for common primary-care and hospital infections. For 71 countries with available data, we estimate an expected Watch DID range of 2·1–7·3 DID after accounting for burden of infection in primary and higher levels of care. Fifty of the 71 countries are using more Watch antibiotics than expected based on burden (**Figure 5**). Absolute differences between observed and expected Watch use vary; the minimum difference between observed and expected was –0·8 DID and the maximum was 21·7 DID (**SI pg 2–4**). These estimates of overuse indicate that more appropriate Watch antibiotic use (e.g., using amoxicillin rather than third-generation cephalosporins for primary-care respiratory tract infections) could help countries meet the target.

A country's target for an appropriate share of AWaRe antibiotic use could be determined through a UN process, and implementation would be part of individual countries' national action plans. This long-term goal would require considerable data and the ability to determine country-specific levels of AWaRe use and relate that to (sub)national estimates of infectious disease burden, going beyond information about resistance rates alone.

3. Achieving 30% reduction in inappropriate animal AMU

Antibiotic use selects out antibiotic-resistant bacteria in animals, just as in humans. Resistant bacteria can be transferred to farmworkers and to the public during food preparation in the home. Furthermore, farm effluents contain both antibiotic residues, which can drive environmental bacterial resistance, and antibiotic-resistant bacteria, which contaminate the environment and can enter the food chain.

Use of antibiotics in the animal sector varies across animal categories—food vs. companion animal, aquatic vs. terrestrial. A 30% reduction in overall AMU in animals is a broad goal; substantially higher reductions may be achievable in some countries and sectors. Effective, sustained reductions require a multi-modal approach because of the complexity of the problem: different animals, interests (e.g., economical production, public health), and actors (e.g., veterinarians, food producers, pharmaceutical companies, nutritionists, companion animal owners).

A significant percentage of AMU in animals can likely be discontinued without consequences because of the presumably substantial (albeit unknown) amount of unnecessary use, particularly for group prophylaxis. Two barriers to antimicrobial stewardship are inertia and resistance to change. Achieving the target reductions, particularly as food animal production and companion animal ownership rise, will require improved animal housing and management, quality feeds to reduce vulnerability to disease and subsequent regular antimicrobial use, education of animal owners and veterinary personnel, better access to veterinary care, treatment guidelines to ensure prudent use for sick animals, and quality vaccines and antimicrobials (particularly lower-tier agents).[34]

The global 30% reduction can be achieved through incremental actions in many sectors. Setting and monitoring species- and sector-specific targets, especially for appropriateness of use, will require granular data. Sub-targets could include no use of medically important antimicrobials for growth promotion, no use of highest-priority, critically important antimicrobials for group prophylaxis, and all administration under the guidance of a veterinary professional. Sub-targets for species and life stages might specify group prophylaxis of less than 40% of post-weaning pigs, prophylactic dry-cow treatment in less than 20% of cows, and for a given condition, a percentage of treatment consistent with a national or international clinical guideline. Targets for drug access could call for universal veterinary access to selected lower-tier antimicrobials or access to at least one first-line option from treatment guidelines, as well as vaccines and veterinary support.

We advocate for integrating animal AMU into the AWaRe system while differentiating patterns of use in humans versus animals and in livestock versus companion animals. A veterinary equivalent of the WHO's AWaRe framework could be used for education, intervention, and surveillance. Integrating antibiotics used in animals into an AWaRe framework would help in setting targets, such as ensuring availability of Access drugs and reducing use of Watch and Reserve drugs.

Implementing strategies to achieve the target must not compromise animal welfare, effective treatment of individual animals, or safe, economical production of food. This requires parallel animal health system improvements—analogous to IPC, WASH, and vaccination efforts for humans.

However, animal welfare and food production cannot be excuses for not improving animal management to reduce AMU.

Although we believe this target reduction is eminently achievable, appropriate use of antibiotics is critical to maintain animal health and is intimately linked to human livelihoods; as such, antibiotic use in animals is part of a One Health approach.[35,36]

ACCOUNTABILITY

Accountability mechanisms are essential for tackling problems of global commons like AMR. An independent scientific body with multi-stakeholder engagement, such as the proposed IPAAR, is needed to inform policy change and action. The 2016 UNGA HLM declaration mandated that '*all research and development efforts should be needs-driven, evidence-based and guided by the principles of affordability, effectiveness and efficiency and equity, and should be considered as a shared responsibility*'. To realise this mandate, we reiterate calls for the formation of IPAAR, akin to the Intergovernmental Panel on Climate Change. Similarly, this intergovernmental panel would inform the Quadripartite and Global Leaders Group (or another governance body, as agreed) on the scientific, technical, and socioeconomic aspects of AMR, its consequences, and future risk. It would also present options for reducing the rate of AMR growth. The panel would set up a mechanism to deliver assessment reports reviewing progress and recommend incentive mechanisms for action. It would be up to the governing body to persuade non-participating governments to act in the interest of the global good. Setting up such a panel has financial implications. One option is to embed AMR into a broader, One Health evidence-generating panel that also addresses the needs of pandemic preparedness and response; however, the possibility that AMR would be deprioritized within a larger panel is a risk.

Global governance on AMR has made some progress since 2016, but only two of the four main governance actions called for in the Inter-Agency Coordination Group report in 2019 have been realised: establishment of a One Health Global Leadership Group on AMR (Global Leaders Group, GLG) and a Quadripartite joint secretariat.[37] Each representative body of the Quadripartite has its own mandate but collaborates through a memorandum of understanding (MOU) on shared goals, with emphasis on AMR. The MOU provides the legal framework for the four organisations at the human, animal, plant, and ecosystem interface, using an integrated and coordinated approach. Formalising the Joint Partnership Secretariat within the UNGA declaration could provide stability for future coordination.

To promote member states' engagement in global AMR governance, we can learn from the United Nations Framework Convention on Climate Change, which enjoys close to universal membership. To reach comparable universality, we need to acknowledge the current power imbalance: the G7 and G20 country groupings dictate most actions for AMR. Greater influence from the Global South should be the aim. The recent entry of the African Union as a full member of the G20 creates an opportunity for African countries, but equal opportunity does not exist for similar entities in Asia and Latin America. The G77, as the representative body for LMICs, has been largely silent on AMR. It is time for greater involvement.

Integration of AMR into the WHO convention, agreement, or other international instrument on pandemic prevention, preparedness, and response (WHO-CA+)[38] could increase member states' participation in AMR mitigation, but efforts may focus on the next 'Disease X' pandemic rather than the insidious and less visible (but harmful) AMR pandemic. AMR may be better suited to a standalone instrument. Furthermore, unless incorporating AMR into the WHO-CA+ coincides with redressing the inequity in funding for AMR mitigation, efforts are likely to fail. The Green Climate

Fund, set up to mitigate climate change as part of the Cancún Agreement,[39] is an example of funding redress that might be implementable.

Progress on the Global Action Plan for AMR and countries' NAPs has been slow, with lack of coordination, political commitment, financing, and guidance at global, national, and sectoral levels. The complexities of AMR exceed the capabilities of the Quadripartite. Other international entities—UNDP, UNICEF, the World Bank—with a stake in AMR can offer technical and financial resources. The Global Leaders Group primarily engages in advocacy and has limited transparency and accountability. The AMR Multi-Stakeholder Partnership Platform aims to engage multiple actors and voices, but regulatory power and participation of stakeholders have so far been limited. It is therefore time to consider other approaches to combat AMR through a One Health approach.

The STOP TB Partnership could serve as a model for advocating, catalysing, and facilitating sustained coordination and collaboration among stakeholders and partners. Such an initiative would support the development and rollout of innovative approaches and tools while emphasising a holistic, multi-sectoral response to AMR. Positioning it within the United Nations Office for Project Services (UNOPS) in Geneva, which hosts the Stop TB Partnership, offers a strategic advantage. Beyond the logistical and administrative assistance provided by UNOPS, an AMR partnership would benefit from the extensive resources and networks of the UN system. Moreover, being hosted by a neutral UN agency would boost credibility and legitimacy: it would be a neutral voice in AMR advocacy, amplifying partners' voices, mobilizing resources, and connecting partners with shared interests. It would also serve as a platform to foster consensus and synchronise advocacy strategies. Nevertheless, an AMR partnership, like the Stop TB Partnership, would face challenges: stakeholder commitment, global buy-in, and funding.

FUNDING

Insufficient global financing for AMR is impeding mitigation efforts. **Figure 6** shows that programmatic funding for AMR significantly lags that for diseases with smaller burdens. One obstacle is many countries' failure to finance their AMR NAPs using domestic resources.[40,41] Another is an imbalance in global donor investment, which favours R&D over mitigation interventions. Of the estimated US$12.8 billion in R&D funding, the majority is channeled to research, therapeutics R&D, and operational costs[42]; only a fraction goes to R&D for vaccines and diagnostics, and even less goes to behavioural and implementation sciences and local programme implementation. Improvements in human and animal health systems are often not considered part of the R&D domain, despite the glaring need for innovation. In Paper 2,[23] we demonstrated the benefits of investing in prevention, which requires equal investment.

Investing primarily in R&D for new therapeutic agents risks an imbalance whereby new drugs may become available for difficult-to-treat resistant infections—but only for those who can pay. Since the majority of deaths occur in LMICs, this R&D investment, in terms of lives saved, may not reach its potential. Funding access to lifesaving, appropriately used antibiotics should be a priority. Financing for an access campaign could also leverage the experience and infrastructure of organizations such as The Global Fund, which has led campaigns for HIV, TB, and malaria drugs by negotiating prices and streamlining procurement.

Although we do not present costs for the 10-20-30 by 30 targets in this paper, the bulk of the requirements for achieving these goals are already funded through existing mechanisms like the GAVI Alliance. There has been little in the way of new development assistance for prevention of infections from HICs[6], which demonstrates and opportunity for greater contribution from rich countries. A proper costing exercise should be carried out following the adoption of specific targets.

The United Kingdom's Fleming Fund and its Global AMR Innovation Fund (GAMRIF) remain the major funding flow to LMICs for AMR mitigation. The Fleming Fund's investment in laboratories has improved reporting of AMR data to the Global Antibiotic Surveillance System,[46] but major gaps remain; in one systematic review of surveillance across Africa, data were lacking from 40% of countries.[47] Both the Fleming Fund and GAMRIF have recently seen further investment, although £24 million over four years of £39 million in new funding to GAMRIF is earmarked for CARB-X, the early-stage pipeline R&D accelerator.[48] The US government, primarily via the Antibiotic Resistance Solutions Initiative (ARSI) and the Global Health Security Agenda, has also meaningfully contributed to country-level efforts, with its Centers for Disease Control and Prevention contributing more than US$40 million in 2022 via ARSI.[49]

The Pandemic Fund has announced £300 million in its first round of funding to support LMIC pandemic preparedness.[50] Its current focus is laboratory strengthening but also human resources and public health capacity, both of which could support AMR efforts. However, given its focus on general preparedness, the effect on AMR is likely to be dilute. The Global Fund, too, shifted COVID-19 resources towards pandemic preparedness, including AMR.[51,52] Both funds help direct needed resources towards AMR implementation, but with no specific allocation of financing for AMR.

To be effective, global funders must recognize the potential for investing in infection prevention to mitigate AMR within the framework of health system strengthening and universal health coverage. We are not advocating for reduced funding for R&D, but rather for major additional funding for infection prevention, whose benefits are quantified in Paper 2.[23]

AN OPPORTUNITY FOR THE UNITED NATIONS TO RECALIBRATE

Failure to see AMR as a horizontal issue tied to child and maternal survival goals, healthy aging, climate, and indeed, the majority of the SDGs has diminished our ability to safeguard human and animal health. The UNGA AMR-HLM in 2024 is an opportunity to recognize these relationships and take a holistic, One Health approach to the AMR pandemic. The meeting is an opportunity for international cooperation, global governance, and momentum towards AMR mitigation, while establishing the essential components for achievement of longer-term goals.

The United Kingdom, Thailand, and the United States—the countries that have made the most recent progress in mitigating AMR—have political will, clear targets, accountability, and funding.[53,54] These four elements should be incorporated into the political declaration from UNGA AMR-HLM. We suggest including the high-level 10-20-30 by 2030 targets, which are based on current evidence and can realistically be implemented and achieved with today's tools. Establishing IPAAR another priority for inclusion in the declaration: it will facilitate the development of evidence-based targets, based on quality data.

Tracking progress on global targets faces challenges as data variability across antimicrobial use and resistance, standardisation of data collection, and informal provision of healthcare. But these challenges are hardly unique to AMR. We advocate for harmonisation and integration of the One Health global AMR surveillance system across human, animal, and environmental health sectors, using a standardised methodology.

We call upon political leaders of member states in the Global South to prioritise AMR interventions by committing to fully funding their NAPs and workstreams. We call for all leaders of LMICs to build consensus and collective action on AMR through the G77 and other regional and continental governance bodies. We urge the G7 and G20, and HICs in general, to recalibrate their advocacy,

governance, and financing that is required to ensure global mitigation of AMR. Finally, for finance ministers and heads of state, we emphasise the benefits of sustainable funding stream for the AMR interventions that have the greatest potential to ensure health, well-being, and food security.

DECLARATION OF INTERESTS

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CONTRIBUTORS

MMe, RL, & MS conceived the paper. MMe, RL, MS, JW and MMp wrote the first draft. All authors (MMe, JL, MS, AC, KP, WA, MMp, EW, JW, JR, RL) reviewed each draft, provided editorial input, and approved the final submission. JL, RL, KP, AC, and MS performed the modeling and the figures.

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Panel 1. Two priority areas for the Independent Panel on Antimicrobial Access and Resistance
The major barrier to setting AMR targets is lack of a sound evidence base. Further evidence on the following issues is needed.

AMU and AMR in animals. Currently, the food production systems of many countries rely on antimicrobials as a (often less costly) substitute for infection prevention on farms. Because approximately 70% of all antibiotics at a country level are used in animals, evidence for the benefits of improved biosafety and animal husbandry in reducing AMU and hence AMR is needed. Furthermore, despite clear evidence of cross-transmission of resistant bacteria—between humans and livestock,[14,15] between companion animals and owners,[16,17] and from farm to fork[18,19]—the relative contribution of animal vs. human AMU in driving AMR remains unknown.

Risk-adjusted target setting. Strategies to mitigate selection of AMR in bacteria focus on optimising the use of antibiotics—that is, targeting unnecessary use. The definition of 'necessary' depends on the baseline access to antibiotics in a particular country and depends on infection burden, AMR, poverty, and other factors. Overall, we expect that human consumption in low-income countries that lack access to antibiotics needs to increase, whereas the opposite is likely to be true in many high-income countries and some upper-middle-income ones. Target setting will need to be risk adjusted. Additional targets for accessibility and use of specific antibiotics are needed. The WHO's AWaRe system allows for development of these targets to be harmonised across countries. A global standardised approach to antibiotic target setting and implementation is critical for shared learning between national action plans and identify the most effective interventions.

Panel 2. What is 'appropriate' use of antibiotics?

Antimicrobial resistance has a language problem. The terminology we use, whilst now generally adopted at a high political level, continues to be poorly understood by most people. Many languages have no direct translation for terms such as antimicrobial resistance and stewardship, creating a barrier to awareness and education.

Various adjectives are used to describe antibiotic use as correct (or not): appropriate, rational, responsible, prudent, judicious, optimal (and their antonyms). Whereas 'prudent' prescribing is often used in animal health, other descriptors are favoured in the human health sector.

All such words require context. It may be judged inappropriate, imprudent, or injudicious to obtain an antibiotic over-the-counter in most high-income countries with well-functioning health systems and a legal requirement for a doctor's prescription. However, you would be hard pushed to describe an antibiotic obtained from a street vendor in the rural Global South as inappropriate or irresponsible if a woman must walk two hours to a clinic to seek help for her sick child. In an overarching sense, 'appropriate' relates to the right patient [having access to and] and receiving the right antibiotic, at the right time.

Identifying appropriate prescribing requires monitoring and evaluation systems. In hospitals and some community settings in HICs, electronic prescribing and pharmacy systems serve this purpose, but most LMICs still use paper-based systems, and detailed clinical information with which to judge appropriateness is often scant. Moreover, human resources are lacking to fulfill this function.

Rather than a call for a volume-only reduction in total antibiotic use, Target 2 aims for a 20% reduction in inappropriate antibiotic over use, for two reasons. First, HICs can use existing monitoring and evaluation systems to report progress towards the target, and second, LMICs may need support to build such systems.

HICs that use evidence-based guidelines for indication and duration of antibiotic treatment for individual infections (e.g., National Institute for Health and Care Excellence, NICE) can determine appropriateness of antibiotic use, employing electronic record systems in humans. Similarly, for livestock prescribing, appropriateness would be benchmarked against the Codex Alimentarius.

The WHO has developed a point prevalence survey tool to enable monitoring and evaluation of 'appropriate' use, which is a valuable tool for all countries. Furthermore, the development of the WHO AWaRe system provides an excellent opportunity to monitor appropriate use against the infection syndromes detailed in the WHO AWaRe antibiotic book. Furthermore, research programmes such as ADILA,[24] which uses antimicrobial resistance, prescribing, and consumption data to inform country antibiotic guidance and local action, will ultimately help us understand whether antibiotic consumption is consistent with underlying disease burden.

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FIGURE CAPTIONS

Figure 1. Defined daily doses/1000 inhabitants per day (DID), point estimates obtained from the GRAM Project[2] by A) World Bank income group classification and B) WHO Region.

Figure 2. AMR-associated mortality averted by scaling up IPC, WASH, and vaccine interventions. A. Estimated annual per capita AMR-associated mortality rates. **B.** Annual projected AMR-associated deaths (as of 2030) avertible by implementation of infection prevention and control, WASH and vaccine interventions. Refer to paper 2 in this *Lancet* Series for details.[23] Scenarios: IPC in healthcare facilities is improved such that an additional 20% of healthcare providers adopt hand hygiene, relative to current levels in each country;[27] countries achieve universal access to WASH infrastructure; upper-middle-income countries provide universal coverage with paediatric vaccines. We present stratified estimates for countries by low-income, lower-middle-income and upper-middle-income groupings (left) and for all LMICs (centre). Estimated deaths as of 2030 apply age-specific estimates of averted mortality to projected changes in population size for each country.[28] Bars indicate median estimates, with accompanying lines denoting 95% confidence intervals. Numerical estimates (right) convey median estimates, with accompanying 95% confidence intervals in parentheses.

Figure 3. Human antibiotic use averted by scaling up WASH and vaccine interventions. A. Annual per capita antibiotic use rates. **B**. Annual projected antibiotic use (as of 2030) avertible by implementation of WASH and vaccine interventions. Refer to paper 2 in this *Lancet* Series for details.[23] Scenarios: countries achieve universal access to WASH infrastructure; countries achieve universal coverage with paediatric vaccines. Effects with and without universal coverage with seasonal influenza vaccines are in orange and red, respectively. We present stratified estimates for countries by low-income, lower-middle-income and upper-middle-income groupings (left) and for all LMICs (centre). Estimated volumes of antibiotic use of 2030 apply age-specific estimates of use rates to projected changes in population size for each country.[28] Bars indicate median estimates, with accompanying lines denoting 95% confidence intervals. Numerical estimates (right) convey median estimates, with accompanying 95% confidence intervals in parentheses.

Figure 4. **Estimated changes in country-specific DID by income group for A) absolute change in DID and B) percentage change in DID.** Dashed vertical line at 0 with negative values indicated decreases in DID/percentage and positive values indicated estimated increases. See **SI pg 2-4, 6** for additional details.

Figure 5. Expected Watch DID based on burden of dysentery, typhoid, lower respiratory tract infections and sepsis plus a benchmark excess Watch DID. See **SI pg 2-4** for methodology.

Figure 6. Global antimicrobial resistance, tuberculosis, HIV/AIDS, and malaria programmatic spending, 2017-2021. We illustrate the global programmatic spending for antimicrobial resistance (AMR), tuberculosis (TB), HIV/AIDS, and malaria for the years 2017–2021. Data for AMR is from the Global AMR R&D Hub's Dynamic Dashboard: AMR R&D Investments Gallery;[42] 2021 data was not complete at time of publication, so spending is estimated from 2019–2020 trends. Data as of October 26, 2023. Data for malaria is shown in 2021$; data from Figure 6.2 in World Health Organization World Malaria Report 2022 estimated to nearest billion.[43] Data for TB is shown in 2021$ for 136 low- and middle-income countries that make up 98% of global TB burden; data from World Health Organization Global Tuberculosis Report 2022.[44] Data for HIV/AIDS is shown in 2019$ for low- and middle-income countries; data from UNAIDS.[45]

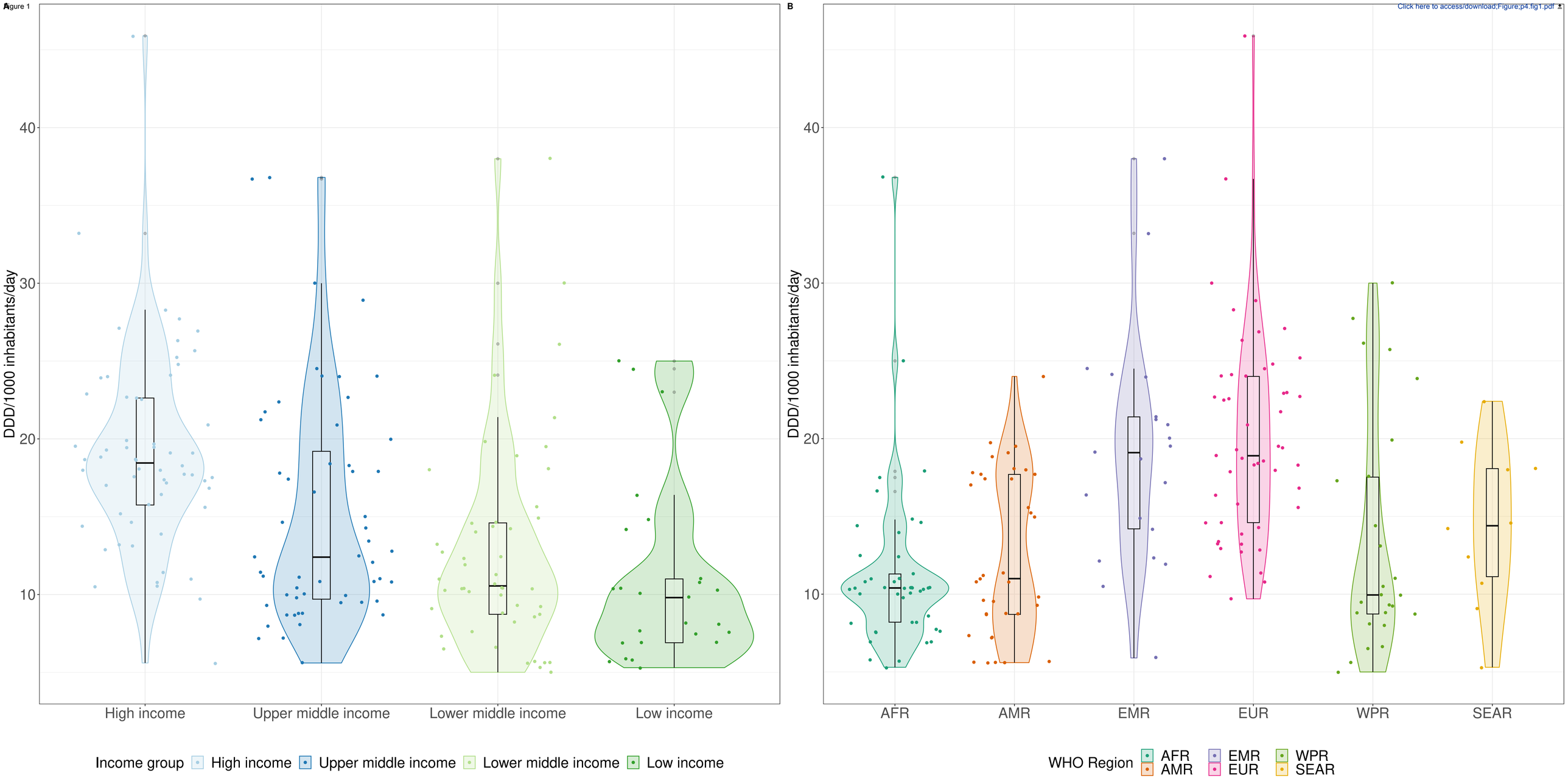
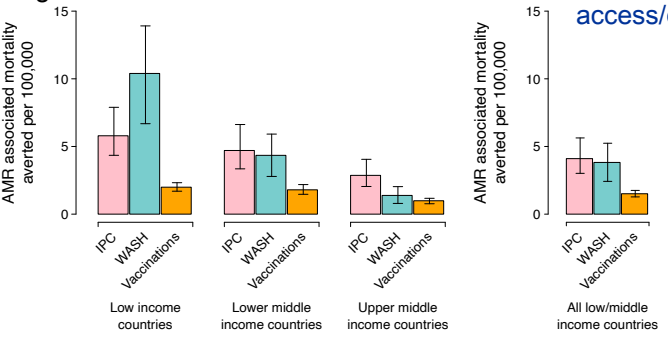
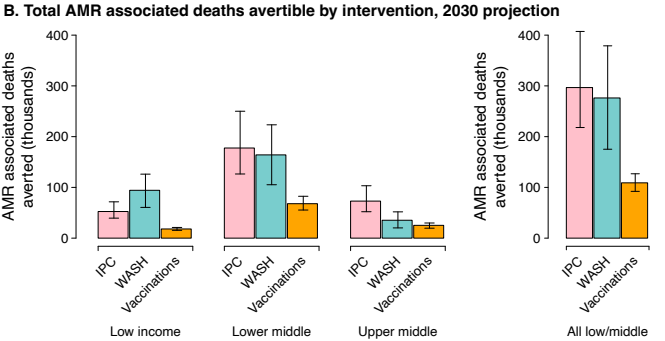


Figure 2

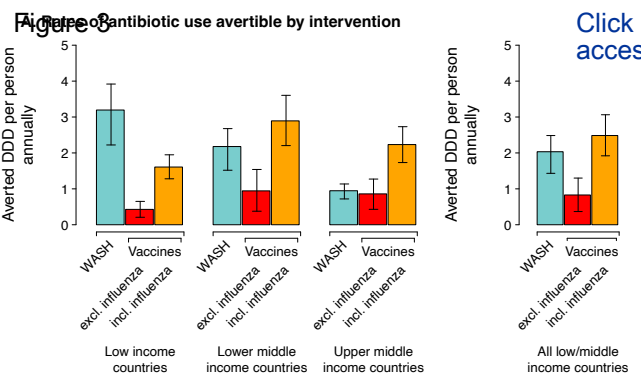


	Mortality averted (per 100,000)	Prop. AMR mortality averted (%)
Increasing IPC compliance by 20%		
Low income	5.8 (4.3–7.9)	7.0 (5.1–9.8)
Lower middle income	4.7 (3.3–6.6)	6.3 (4.3–9.3)
Upper middle income	2.9 (2.0–4.1)	5.5 (3.7–8.3)
All low/middle income	4.1 (3.0–5.6)	6.2 (4.4–8.6)
Achieving universal WASH access		
Low income	10.4 (6.7–13.9)	12.6 (7.8–17.4)
Lower middle income	4.3 (2.8–5.9)	5.8 (3.7–8.3)
Upper middle income	1.4 (0.8–2.0)	2.6 (1.4–4.1)
All low/middle income	3.8 (2.4–5.2)	5.7 (3.5–7.9)
Achieving universal coverage of select pediatric vaccines		
Low income	2.0 (1.7–2.3)	2.4 (1.9–3.0)
Lower middle income	1.8 (1.5–2.2)	2.4 (1.9–3.1)
Upper middle income	1.0 (0.8–1.2)	1.9 (1.4–2.5)
All low/middle income	1.5 (1.3–1.8)	2.3 (1.9–2.7)
All interventions (combined impact)		
Low income	18.3 (14.7–21.4)	22.1 (16.8–27.7)
Lower middle income	10.9 (9.2–12.7)	14.7 (11.4–18.6)
Upper middle income	5.3 (4.4–6.2)	10.1 (7.6–13.2)
All low/middle income	9.5 (8.0–10.9)	14.2 (11.4–17.2)



	Deaths averted (thousands)	DALY losses averted (millions)
Increasing IPC compliance by 20%		
Low income	52.5 (39.4–71.6)	2.9 (2.2–3.9)
Lower middle income	177.6 (126.5–250.1)	7.4 (5.4–10.3)
Upper middle income	73.0 (52.1–103.2)	1.9 (1.4–2.7)
All low/middle income	296.7 (218.0–407.3)	11.7 (8.8–16.0)
Achieving universal WASH access		
Low income	94.3 (60.6–126.1)	6.1 (4.1–8.2)
Lower middle income	164.0 (105.3–223.3)	8.9 (5.8–12.0)
Upper middle income	35.3 (20.2–51.8)	1.0 (0.6–1.4)
All low/middle income	276.2 (175.2–378.9)	14.9 (9.8–20.1)
Achieving universal coverage of select pediatric vaccines		
Low income	18.1 (15.4–21.1)	1.4 (1.2–1.6)
Lower middle income	67.9 (55.4–82.5)	4.9 (4.0–6.1)
Upper middle income	25.2 (19.6–29.9)	0.9 (0.8–1.1)
All low/middle income	109.0 (92.2–126.9)	7.0 (5.9–8.3)
All interventions (combined impact)		
Low income	165.9 (133.2–194.4)	10.5 (8.4–12.3)
Lower middle income	413.3 (345.5–479.6)	21.4 (18.1–24.8)
Upper middle income	134.3 (113.0–158.2)	3.9 (3.3–4.4)
All low/middle income	687.2 (578.1–786.9)	33.8 (28.6–39.0)

Figure 3



	DDD averted (millions)	Prop. antibiotic use averted (%)
Achieving universal WASH access		
Low income	417.1 (290.1–511.6)	24.6 (17.1–29.9)
Lower middle income	738.1 (514.5–907.4)	11.4 (7.9–13.9)
Upper middle income	117.9 (89.5–141.4)	5.3 (4.0–6.4)
All low/middle income	1207.9 (850.4–1475.4)	11.5 (8.1–14.0)
Achieving universal coverage of select pediatric vaccines		
Low income	209.9 (167.1–254.3)	12.4 (9.9–14.9)
Lower middle income	980.1 (746.9–1221.3)	15.1 (11.5–18.8)
Upper middle income	278.1 (215.7–340.0)	12.5 (9.7–15.3)
All low/middle income	1476.1 (1140.4–1819.4)	14.1 (10.8–17.3)
Achieving universal coverage of select vaccines (excl. influenza)		
Low income	55.8 (27.2–85.0)	3.3 (1.6–5.0)
Lower middle income	319.6 (127.6–521.8)	4.9 (2.0–8.0)
Upper middle income	107.0 (53.5–158.4)	4.8 (2.4–7.1)
All low/middle income	492.5 (218.3–771.9)	4.7 (2.1–7.4)
WASH and vaccine interventions (combined impact)		
Low income	627.8 (494.4–734.3)	37.0 (29.1–42.9)
Lower middle income	1714.5 (1396.8–2014.2)	26.4 (21.6–31.0)
Upper middle income	395.6 (327.3–463.5)	17.8 (14.7–20.8)
All low/middle income	2680.5 (2197.1–3122.9)	25.5 (20.9–29.7)
WASH and vaccine interventions (combined impact, exl. influenza)		
Low income	473.2 (342.4–572.4)	27.9 (20.2–33.4)
Lower middle income	1054.2 (755.3–1319.0)	16.2 (11.7–20.3)
Upper middle income	224.7 (163.9–282.3)	10.1 (7.4–12.7)
All low/middle income	1695.8 (1247.8–2083.3)	16.1 (11.9–19.8)

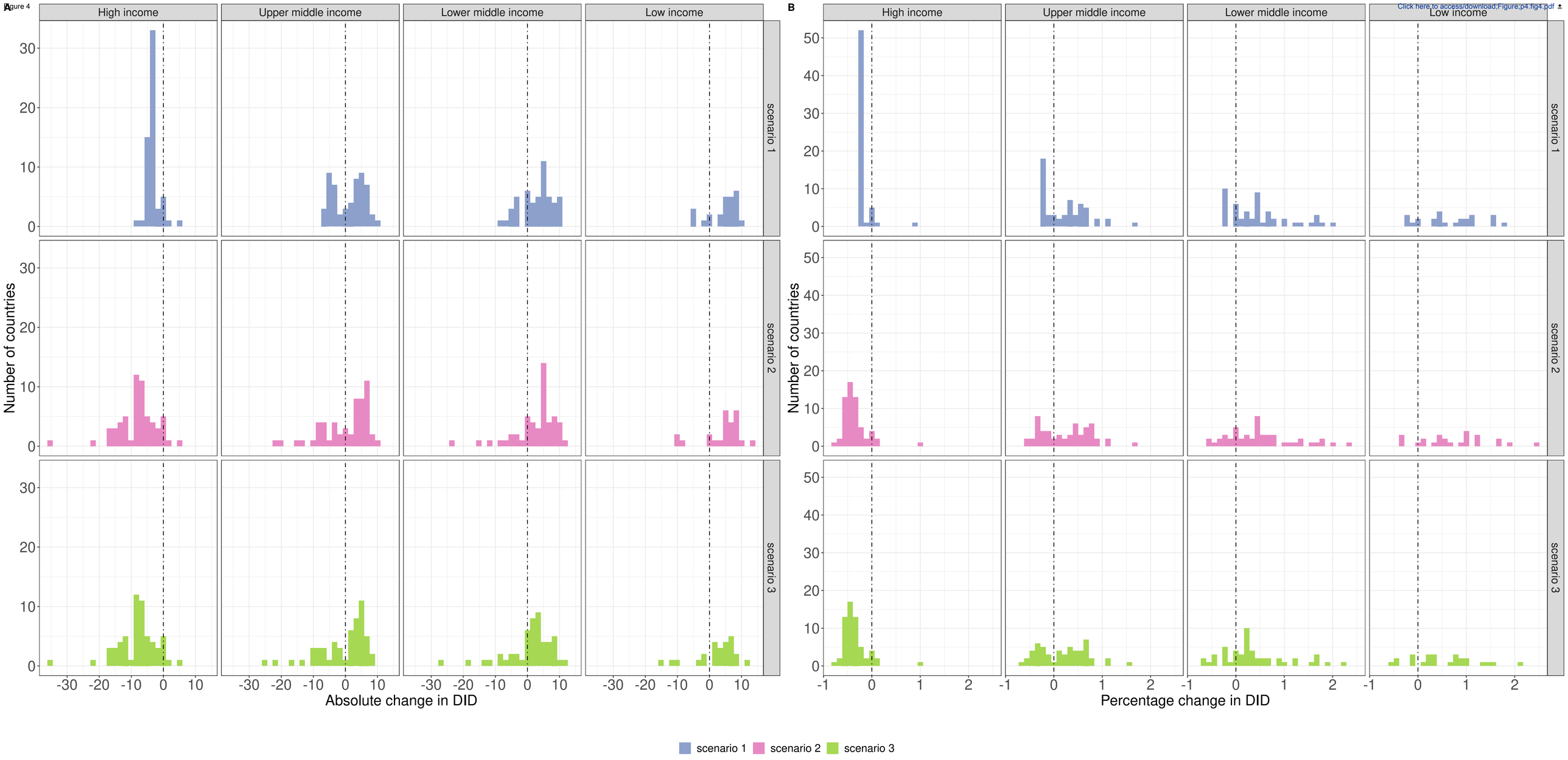


Figure 5

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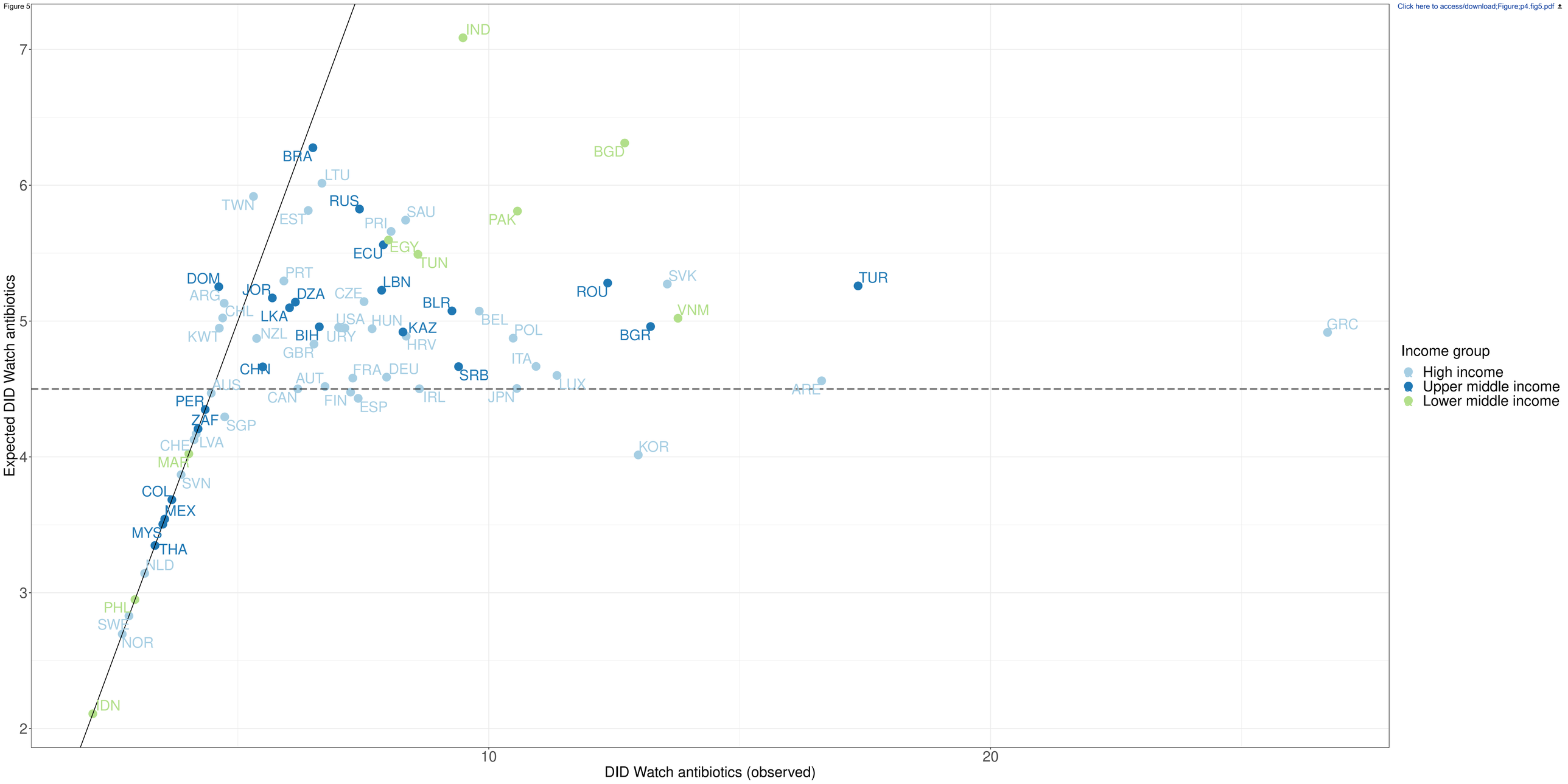

Figure 6

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