

Abstract

Aims. Chronic disorders, such as cardiovascular disease, cancer, respiratory diseases and diabetes, are the leading cause of mortality globally, representing 68% of all recorded deaths. The incidence of chronic disease and multiple chronic disease is rising across the world but relatively little is known about the impact of multimorbidities on the life experiences of those individuals that encounter them. In this paper, we examine and quantify the relationship between chronic illness, multimorbidity and the individual self-assessed health of the Russian population using individual level Russian data and a novel quantitative technique.

Methods. We apply a partial proportional odds framework to a rich dataset incorporating demographic, socioeconomic and health indicators in Russia.

Results. We find that: individuals with chronic conditions report significantly lower levels of health than those without chronic conditions, but that the strength of the effect is much more pronounced for males than for females (e.g. neurological disease: OR=4.81 for men; OR=1.86 for women)). As the number of co-morbidities increases, there is a dramatic decrease in the likelihood of reporting good health for both males and females, but for males there is a greater increase in the likelihood of reporting bad health (OR=49.31 for males with 5+ diseases; OR=28.05 for females).

Conclusion. Over 40% of Russians currently live with multimorbidity and this group is at the highest risk of reporting poor self-rated health. This research adds to the body of evidence demonstrating the challenges facing healthcare systems as new patterns of disease take hold in contemporary society.

Keywords: self-assessed health; chronic illness; multimorbidity; gender; partial proportional odds model; RLMS; Russia.

Word count: 6294 words.

1 Introduction

The importance of addressing the growing challenges that stem from rising chronic disease prevalence are now widely recognised [1]. There is a clear relationship between chronic illnesses and mortality: 68% of all deaths globally are due to chronic disease, with three-quarters of those occurring in low and middle income countries [2]. In richer countries, it has been found that around half of those diagnosed with one chronic disease actually have more than one [3]. In Russia the corresponding figure is 35% [4]. The implications of being afflicted by multiple chronic diseases are stark. Not only do patients with multimorbidities have poorer health outcomes than those with a single condition [5], but they also require more interaction, and over longer time periods, with primary and secondary care providers. The morbidity classifications alone give little insight into any individual's actual personal health experience when confronted by multiple chronic diseases and so the views and experiences of the patients and sufferers themselves must be incorporated into the social response.

Self-assessed health is an important measure and a reliable predictor of more objective health outcomes [6; 7]. There is an emerging body of empirical literature, based on quantitative data from developed and developing countries, that has explored the relationship between self-assessed health, chronic conditions and multiple morbidities. In 2003, Mäntyselkä et al. [8] found a negative effect of chronic pain on health status in Finland. In 2013, using Irish data, McDaid et al. [9] demonstrated that the older population reporting multimorbidities are at the highest risk of poor self-assessed health. A year later, Mavaddat [3] confirmed the negative relationship between multimorbidity and self-assessed health using UK data. More recently, similar approaches have been applied using data from developing countries: Chan et al. [10] found that, in Malaysia, poor self-assessed health was connected with asthma, arthritis, heart disease and several other illnesses; while Arokiasamy et al. [4] confirmed and quantified the relationship between multimorbidity, chronic illness and poor self-rated health for a combined dataset with observations from China, Ghana, India, Mexico, Russia and South Africa.

While several previous studies have explored self-assessed health using the data that we draw on in this paper [11-13], none have explored the relationship between self-assessed health and multiple morbidities. We address this gap in the literature by examining and quantifying the relationship between chronic illness, multimorbidity and the individual self-assessed health of the Russian population using Russian household survey data. In doing so, we provide the first systematic analysis of the prevalence and patterns of multiple chronic illness in Russia and employ a novel empirical approach to identify important and subtle differences that relate to the gender gap in lived health experience.

The paper proceeds as follows. In section 2 we motivate our empirical approach with reference to the population health literature and the specifics of the Russian context. Sections 3 and 4 respectively describe the data and give an overview of the empirical methodology that we utilize. Our results are detailed in section 5 and further discussed in section 6. Section 7 summarizes our conclusions and identifies important policy implications.

2 Background and related literature

Our approach to estimating the determinants of self-assessed health draws on different social science approaches. From economics, we draw on the well-known Grossman model [14] postulating that health declines with age, increases with wages/income and decreases with the price of health care. From social epidemiology, we refer to literature that has argued in general terms [15] and in region specific terms [12] about the direct and indirect mediating role that socioeconomic and demographic characteristics have on health outcomes.

The empirical literature has explored these approaches exhaustively in Russia and Eastern Europe, finding a positive effect of education on health, including with subjective measures [12: 13]. A positive relationship between income and self-assessed health is also confirmed in empirical studies for Russia [13], and so too is the inverse relationship between age and health [16]. Similarly, the empirical

literature exploring the role of gender, marital status, household size, type and region of residence, and characteristics of settlement type is rich indeed [11-13]. Gender is a key variable across this literature. As in many countries, in Russia there are strong gender differences in reporting health status, with women rating their health less highly than men do [13]. This observed reporting effect is in stark contrast to the absolute gender health differences in the Russian population. In 2014, male life expectancy (65 years) was more than 11 years below that of Russian females [17].

In addition to these traditional determinants, we focus on the impact that (noncommunicable) chronic diseases and multiple chronic diseases have on self-assessed health outcomes. Chronic diseases tend to develop slowly and progressively, become persistent and are often incurable. The effects on an individual's quality of life are variable and disease specific. Some chronic conditions can cause few problems, others can give rise to episodic problems and some symptoms can be, at least partially, controlled by medication. In many cases (e.g. oncological and neurological illness), chronic illness can severely constrain an individual's lifestyle, affecting the ability to work, to be mobile, to live independently and/or to undertake routine daily tasks; often they are accompanied by symptoms associated with depression.

A negative relationship between chronic illness and self-assessed health has been confirmed for several developed countries – Finland [8], Ireland [9], UK [3] – as well as developing ones – Ghana, India [4] and Malaysia [10]. As the number of chronic conditions increases, the negative consequences for subjective health correspondingly increases.

Before turning to our empirical contribution, it is helpful to reflect briefly on the Russian health context. Following the breakup of the Soviet Union, the Russian health system underwent significant changes: moving from budgetary health funding to comprehensive mandatory health insurance, decentralising the governance of healthcare, allowing the emergence of a nascent private sector, and adopting new contracting models and provider payment methods. Underscoring these reforms was the

1993 constitutional right to health care, free at the point of delivery, and defined annually through the Program of State Guarantees [18]. Provision through this Program has been far from comprehensive and yet the population, constrained by low income, has been slow to take up voluntary insurance top-ups.

For most of the post-Soviet period, the significant reforms to financing have not been mirrored by corresponding reforms in healthcare delivery, population health behaviours or public health promotion. The legacy of the ‘Semashko’ healthcare model and the behaviours and expectations that it gave rise to have persisted.

While there have been strong, recent, initiatives to discourage unhealthy behaviours, tobacco and alcohol consumption remain widespread and are among the leading factors contributing to low male life expectancy. Similarly, there is a limited response to the promotion of healthy behaviours: according to a Levada Center survey of 2011, 25% of respondents in Russia reported doing nothing to improve their health and those reporting regular physical exercise remain in a small minority .

Russians are also slow to access preventative or early detection medical care and their expenditure on and consumption of medicine is low by international standards and often substituted with folk and alternative medicines (e.g. herbal medicine, homeopathy, mineral baths). Accordingly, Russia is, respectively, 3 and 5 times behind the average European and US drug consumption rates. In contrast, with a healthcare delivery system still oriented around inpatient care, Russians do actively seek inpatient medical assistance to treat chronic conditions since this guarantees that expenditures on expensive drugs are covered through the State Guarantee.

In this public health context, it is no surprise that chronic diseases account for 86% of all deaths in Russia [19] or that the probability of dying from four major chronic illnesses – cancer, diabetes, cardiovascular disease, and chronic respiratory diseases – between age 30 and 70 is estimated at 30%.

3 Data and descriptive statistics

We use data from the most recent wave of the Russian Longitudinal Monitoring Survey-Higher School of Economics (hereafter, RLMS) [20], a nationally representative household survey that has been conducted as a repeated cross-section survey in Russia for more than twenty years. The RLMS is a publicly available source of data (<http://www.cpc.unc.edu/projects/rlms-hse>) which satisfies the requirements for ethical treatment of human subjects in accordance with standards set forth by the Institutional Review Board (IRB) at the University of North Carolina at Chapel-Hill. The main phase of the survey began in 1994 and it has been repeated annually since then, other than in 1997 and 1999.

The survey targets 4,000 households using multistage probability sampling to obtain a nationally representative sample for Russia. The survey strategy is predicated on the principle of ‘repeated sampling of dwellings’ [21], in which all household members are interviewed each year (if they can be contacted within three visits), and then the dwelling itself (rather than the household) is followed [13]. The response rate for the nationally representative sample of households, residing at the address of the original sample of 1994, was 47.7% in 2013. To mitigate against attrition the sample has been replenished several times [13]. The response rate within households has been consistently high with around 97% of individuals listed in the household rosters completing the questionnaires. Correspondingly, the distribution of the sample by sex, age and education matches the equivalent distribution of the nearest census data with the difference not exceeding 1-2 percentage points in any category.

For our analysis, we draw on 12,360 complete cases, from the replenished cross-section of the 2014 data, including responses covering social, economic, demographic and health characteristics from respondents aged 14 and over. Table 1 provides the variable definitions and summary statistics for our data. In our analysis, we follow the RLMS-based literature and the recommendations of Solon, Haider and Wooldridge [22] in using the unweighted data, which also provides for approximately 4,000 additional observations. The price of obtaining these substantial additional data is to sacrifice strict

representativeness and therefore to remove the possibility of using the population weights provided with the smaller representative sample. In our regression analysis, we compensate for this by including all of the variables used to create the RLMS weights as independent variables in our estimates, while our descriptive statistics are mainly intended to describe these data rather than to proxy the definitive population parameters. As a robustness check, we re-estimate all of our specifications using the smaller sample and the RLMS population weights. We find no discernible qualitative difference in the results, with the possible exception that the education gradient is even sharper in the weighted estimates. For the sake of brevity, we don't present these results here, but they are available on request from the authors.

Our dependent variable is derived from a standard survey question: *'Tell me, please: how would you evaluate your health?'* (*very good; good; average; bad; or very bad*). We adopt a '3-level' health state variable (SAH) by merging the categories 'very good' and 'good' into a category 'good health' (35.6%); and 'bad' and 'very bad' into a category 'bad health' (12.8%); with the remainder being classified as 'average health' (51.6%).

We also identify the self-reported incidence of 17 chronic morbidities (see Table 1). The survey asks whether a person currently has any kind of chronic illness. These conditions have no timeframe: a person could be diagnosed with an illness many years ago, when he/she was still a child, or more recently. The absence of this timeframe distinguishes the question from alternative forms which allow onset and formal diagnosis to be measured: "In the last 12 months has a doctor told you that you have...". While the RLMS survey doesn't allow us to identify onset exactly, we are able to measure the total number of chronic illnesses that each respondent has accumulated up to the point of the survey. We do though acknowledge that there may be divergence between doctor diagnosed diseases and the self-reported totals that we use for our multimorbidity measure, which differentiates between single condition, two condition, three condition, four condition, and 5 or more condition respondents.

The most common chronic disease reported by both genders is high blood pressure (18.2% for men and 33.8% for women). The rarest condition, cancer, is present in 1% of males and 2.1% of females. These data confirm that more women (66.9%) than men (51.9%) report having at least one chronic illness and that, among these, 72.1% of females and 59.7% of males report 2 or more morbidities. Overall 41% of the sample report having more than one chronic disease, a finding which is broadly consistent with that (of 35%) reported in the literature [4].

4 Econometric approach

Our dependent variable “worsening self-assessed health” is categorical and ordered (good health, average health, bad health). There are several modelling options for such data and the correct choice should be informed by testing the proportional odds assumption, that the relationship between each pair of categories is the same, using the Brant test [23]. If the hypothesis of proportional odds is rejected, as it is in our case, then the *generalized* ordered logit model, as in (1) below, should be applied, with M representing the number of categories:

$$P(Y_i > j) = g(X_i \beta_j) = \frac{\exp(\alpha_j + X_i \beta_j)}{1 + \{\exp(\alpha_j + X_i \beta_j)\}}, \quad j = 1, 2, \dots, M-1 \quad (1)$$

From (1) it can be demonstrated that the probability of the dependent variable, Y , taking on each of the values $1, \dots, M$ is equal to:

$$\begin{aligned} P(Y_i = 1) &= 1 - g(X_i \beta_1) \\ P(Y_i = j) &= g(X_i \beta_{j-1}) - g(X_i \beta_j), \quad j = 2, \dots, M-1 \\ P(Y_i = M) &= g(X_i \beta_{M-1}) \end{aligned} \quad (2)$$

When $M > 2$ the model becomes equivalent to a series of binary logistic regressions in which the categories of the dependent variables are combined [24]. In our analysis, where $M=3$, for the $J=1$ case, category 1

(good health) is contrasted with categories 2 and 3 (average health and bad health) and for the $J=2$ case, category 3 (bad health) is contrasted with categories 1 and 2 (good health and average health). That is, when there are 3 categories, the generalized ordered logit model produces 2 sets of odds ratios for each estimation. The first set represents the impact that a unit change in the independent variable has on the odds ratio of being in ‘bad or average health’ rather than ‘good health’, while the second refers to the corresponding impact on the odds ratio of being in ‘bad health’ rather than ‘average and good health’. To be clear, ordered logit regression (i.e. the proportional odds model) is a special case of the generalized ordered logit model: in the ordered logit model the β s are the same for all values of j while in the generalized ordered logit (as shown in (1) above), cut points, which are defined by the β s, are different for each independent variable. A further special case of the generalized ordered model is the partial proportional odds model (PPO). In this model, the β coefficients for values of j vary only for those variables for which the proportional odds assumption is violated. Since the PPO model is more parsimonious than the full generalized ordered model [24] we refer to this model in our results below.

This approach proves particularly valuable in enabling us to tease out subtle gender differences in self-assessed health and its determinants. Estimating each model separately for males and females, we implement three sets of estimates: a base model, incorporating controls for age, marital status, education, income, settlement type and region; a second model, which adds controls for chronic disease to the base model; and a final model, which adds controls for multimorbidity to the base model. Since our categories are ordered from good health to bad health, odds ratios of greater than one indicate that the explanatory variable has a negative association with health.

5 Results

Table 1 suggests that the number of chronic illnesses reported is a very good predictor of self-assessed health. For males, 67% of those with no chronic conditions report being in good health, while 32% of

those with 3 chronic conditions report being in bad health. For women the corresponding figures are 61% and 37%. Chronic conditions increase with age for both males and females: accordingly, 62% of men and women, under 40 years of age, report good health, while just 7.5% of the over 60s report good health.

Base model

Prior to presenting our main results, we briefly describe the results of our base model (Tables S1 and S2). We find strong evidence that age results in declining health ($OR = 1.07$) and that income is positively associated with health, most clearly with the likelihood of avoiding bad health. For males an increase by 1 in the natural logarithm of income reduces the odds of being in bad health by a factor of 0.577 and for females by a factor of 0.691. We also note a significant relationship between reporting bad health and having the lowest level of education ($OR=1.75$ for males and 1.71 for females).

Concerning other covariates, we find that single men tend to report worse health than married men while widowers report better health. Among females, widows report significantly worse health than married women ($OR=1.228$). Living outside of urban areas affects males' health positively while, for women, living in an urban type area is associated positively with good health but has no significant effect on the odds of not being in bad health. In terms of specific regions, the metropolises of Moscow and St. Petersburg are clearly associated with higher self-assessed health for both men and women.

Chronic diseases

Tables 2 and 3 present the same model but with the inclusion of a set of chronic disease dummy variables. As anticipated, for both males and females, most chronic diseases are good predictors of poor self-assessed health. It is the milder chronic conditions which are the non-significant ones: allergies, eye diseases, kidney disease and varicose veins for males; eye disease, allergies and skin disease for females.

For females, there are 11 cases for which the proportional odds vary between categories, compared to just 5 for males. In each case, the odds ratios for the 'bad and average' versus good health

category are higher than for the bad health (versus ‘good and average’) category. In some cases (kidney and respiratory diseases for women and spinal, diabetes and urogenital disease for men), chronic diseases increase the likelihood of reporting not being in good health but do not increase the odds of reporting being in bad health.

{TABLES 2 AND 3 HERE}

Predictably, there is a lot of variation in the size of the effects across the different diseases. For males, cancer (OR=5.57), neurological disease (OR=4.81) and diabetes (4.94) stand out as having very strong effects on the likelihood of not reporting good health, while heart disease, lung disease, gastrointestinal disease, spinal disease, joint disease and urogenital disease all have odds ratios implying large increases, ranging from approximately 60% to over 250%, in the probability of not reporting good health, compared to the sample average (for details on calculating risk ratios see [25]). In the case of heart, lung, liver, neurological disease and cancer, there is no difference between the odds ratios for reporting ‘not good’ health and definitively bad health.

For females, the strongest effects on health are associated with diabetes (OR=4.58) and cancer (OR=3.67), while suffering from high blood pressure or heart, lung, kidney, gastrointestinal and spinal diseases all more than double the odds of reporting not being in good health. As with males, our results show that for cancer and for neurological disease there is no difference between the self-assessed health categories, while for other chronic diseases, including those with high incidence such as heart disease, females report a lower probability of reporting bad health.

Multimorbidity

Tables 4 and 5 present the base results, which are consistent with those reported earlier, with additional controls for the presence of co-morbidities. The risk of reporting bad or average, rather than good health, for males (females) with one chronic condition, is 189% (164%) higher than for someone with no chronic disease. As expected, for both men and women, as the number of co-morbidities increases so too does the associated risk of bad health, rising to 2.7 (2.5) times the likelihood for males (females) with 5 or more diseases. These risks are high and in all cases the associated odds ratios are significant at the 1% level.

{TABLES 4 AND 5 HERE}

As noteworthy as the size and significance of these odds ratios is, the really striking result relates to the difference between reporting being in definitively bad health rather than simply not reporting being in good health. For males, morbidity and multimorbidity is significantly more likely to result in definitively bad health (other than in the case of having 4 conditions, for which one coefficient is presented for both categories). For example, more than 5% of males report five or more co-occurring chronic illnesses with an odds ratio for being in bad health vs. ‘good and average’ health of 49.3, implying a 35.56 times increase in the risk of reporting bad health.

Finally, although for the sake of brevity not reported in this paper, we run several robustness checks to verify the stability and reliability of our results. First, we repeat the estimates using a simple logit model, based on a dichotomous – good health / bad health – dependent variable. The results are consistent with those presented in this paper but they do not allow for the subtler, and important distinction, between reporting bad health and not reporting good health. Second, we re-estimate the models using only the working age population and although there are marginal differences in the results, there is nothing that is inconsistent with the main findings of this paper. Third, we re-estimate the last set of results excluding the milder chronic conditions and find that the results hold.

6 Discussion

Our estimates of the determinants of self-assessed health consistently suggest important gender differences in the effect of socioeconomic and health characteristics. In terms of the former, consistent with Sinelnikov [26], single men tend to be in worse health than married men, perhaps because single men, outside of the protective environment of the family, often neglect their health. It may therefore seem surprising that widowed men report better health than married individuals do; however, this is likely a selection effect since, in Russia, where life expectancy is markedly lower for men, it is rare for males to outlive their spouses. In contrast, and more in line with expectations, female widows are more likely to report bad health. This can be partly explained by the loneliness and anxiety that often accompany widowhood [27] triggered by their male partners dying at young ages. Living outside of cities has a particularly beneficial effect on males, reflecting the more physical lives that rural males lead, in terms of both occupation and domestic activity, as well as the superior facilities and work based infrastructure that are found in the smaller urban areas.

Overall, for men and women, our baseline estimation finds strong support for the Grossman model, favored by economists, in terms of age, income and education, while these results, as well as others concerning marital status, settlement-type and region are consistent with the effects found for other countries and earlier periods in Russia discussed widely within the social epidemiology literature. [11-13].

When we control for the presence of chronic diseases we again observe important gender distinctions. For males, we observe no difference in the odds of reporting different health outcomes for neurological diseases, cancer or for other disabling diseases. We interpret this as evidence that these are diseases, not only with the greatest detrimental effect on health, but that also leave the sufferer with limited scope for meaningful adaptation. For example, unlike diabetes, also a serious condition that

requires lifestyle changes and permanent treatment, these disabling diseases, associated with persistent pain, uncomfortable treatment regimens and high risks of premature mortality [28] cannot be accommodated in the same way. The situation is different for women: it is much more likely that a chronic disease will result in reporting not good health rather than definitively bad health. Also, for all illnesses except neurological, oncological and urogenital system diseases the odds ratios for reporting bad health are lower than for reporting not good health. This suggests an intriguing superior capacity for women to accommodate certain types of severe morbidities. We speculate that this might reflect a tendency towards earlier detection and therefore improved prognosis via a greater (earlier) interaction with the medical sector (e.g. screening). This is an important area for future research. When comparing our estimates to earlier studies, we find that ORs for heart disease for females are identical to the same estimate for the UK (OR=3.8) [3], while estimates for males are very close to the ones obtained for the Malaysian population (OR=2.56 vs OR=2.94). However, we find that the negative effect of diabetes is greater in Russia than in the UK and Malaysia but is close to the estimates for Ireland (OR=4.09) [9].

The proportional odds model also allows us to see that multimorbidities have a less adverse effect on females than on males. This difference could stem from heterogeneity in reporting practice with, for example, women reporting even minor conditions while men, if they choose to report at all, only report those conditions that bring more severe discomfort and that cannot be ignored in the self-assessment of health. To understand the impact of reporting heterogeneity on self-assessed health is beyond the scope of this paper, but is clearly another important line of future enquiry. Our multimorbidity results are not directly comparable with similar studies [4; 9] since we provide gender specific estimates. However, if we compare our results for males, we see that our estimates for four illnesses (OR=18.30) are higher than in the study by Arokiasamy [4] (OR=12.30 for 4+diseases) but lower than in the study for a harmonized sample from the Republic of Ireland and Northern Ireland (OR=45.21 for 4 diseases) [9].

Finally, our study is the first of its kind for Russia and, in addition to prompting important questions for future research, also comes with caveats. First, the estimates we provide are multivariate correlations that reflect the empirical relationships within the data. As with the bulk of the health outcomes and health valuation literature, beyond informed speculation, we do not and cannot make any claims about causality. Second, and more important, in the count of chronic conditions that formed our multimorbidity measure, we assumed that each chronic illness had an equivalent impact on the individual's health experience. Clearly, this is too blunt an assumption but we maintain that our results remain an important first pass in this increasingly important research field.

7 Conclusion

In this paper we have presented the first exploration of the relationship between chronic disease, multiple morbidity and self-assessed health for Russia. The aim of the paper was to examine and quantify the relationship between these phenomena, using a novel empirical approach and situating the results robustly in the context of the emerging literature, particularly by seeking to understand the nuanced interactions of gender and self-assessed health. We make several important contributions.

First, our base model estimates confirm that self-assessed health has the expected relationship with age (negative), income (positive) and education (positive), while confirming that single males and widowed females, along with those in urban settlements are less healthy. We also find that, in Russia, males are more optimistic in reporting their self-assessed health than females. Second, we find a strong negative effect of chronic conditions for both male and female respondents, but with some important and subtle differences according to both gender *and* disease classification. For males, cancer, neurological disease and diabetes have the most powerful impact on the likelihood of not reporting good health. The detrimental impact of diabetes on health status is three times greater than the impact of respiratory diseases. For females, the strongest effects on health are associated with diabetes and cancer. For women,

it is much more likely that a chronic disease will result in not reporting good health rather than reporting bad health. In part, the observed differences in odds reflect the different severities associated with disease but in part also reflect both heterogeneity in reporting (women are more likely to report milder, and a higher number of, chronic conditions) and possibly the greater propensity for women to engage with the medical sector and to adapt to and cope with their chronic illnesses.

Third, we find a strong gender effect in reporting multimorbidities. For males, multimorbidity is significantly more likely to result in the reporting of bad health. Males with 3 chronic illnesses, for example, are 17 times more likely to report bad health. These gender differences could stem from reporting heterogeneity, with women choosing to report relatively minor conditions while men report conditions that bring discomfort and severe deteriorations in their health, or they could reflect that women have a greater knowledge and understanding of their conditions, act on them sooner and are more engaged with the health care sector in managing them. These are crucial questions for further research.

Finally, this study illustrates the damaging effect of chronic and multiple chronic illness on the populations lived experiences of health. Over 40% of Russians currently live with multimorbidity and this group is at the highest risk of poor self-rated health and disability. The evidence of serious ill-health and poor quality of life for males with multimorbidities is particularly strong. Notwithstanding this, systems of health care delivery in the majority of countries, including Russia, remain structured around responding to acute episodes and open to the criticism of being unable to “count past one” [4] but, as multimorbidity advances in Russia, the bills stemming from hospital visits and increasing medication imply potentially impoverishing expenditures for the health sector [29]. Chronic diseases, alone or in combination, require more complex and long-term responses, crossing the responsibility thresholds of different health professionals and extending beyond into welfare services and social care.

To this end, the pioneering work of Vallin and Meslé [30], which examines the growing heterogeneity of life expectancy in advanced economies provides a salutary warning. As life expectancy

increases and mortality becomes increasingly concentrated among the elderly, the challenge of seeking to reduce cardiovascular mortality among the working age and young pensioner populations, morphs into the more complex task of reducing deaths connected with multiple morbidities at more advanced ages. This requires a quite distinctive combination of health sector initiatives. Prevention, early detection and (adhered to) treatment of chronic conditions, among males in particular, could drastically improve the quality of health, and therefore life. The necessary policy responses to consider include awareness campaigns, training within the health labour force, the reform of health care to allow for integrated, comprehensive and ongoing treatment of people with multimorbidities via special programs and the types of multimorbidity clinics already appearing in the US (i.e. at Stanford University), and systematic monitoring of the patterns of multimorbidity and their impact on individual lives. To achieve this, learning, in all of these spheres, from the best of international practice, is necessary.

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