Measuring population health in Moldova: health expectancies

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ABSTRACT

Health measures are decisive for the development and implementation of population health policies. Monitoring health indicators can lead to improvements in health and decrease in the inequalities among subpopulations. The life expectancy at birth for the Moldovan population did not increase considerably during the last decades, due to the social and economic crisis which led to high mortality and poor health. In Moldova, no aggregated health indicators are utilized for health monitoring. Therefore, the authors calculated health indicators to assess the population health and argue their importance. Mortality and subjective data on self-perceived health and self-rated morbidity from the Household Budget Survey was used for constructing period morbidity-mortality tables. Thus, the authors applied Sullivan's method to calculate the life expectancy in very good/good/fair health and the life expectancy without chronic morbidity for the period 2006–2015. The life expectancies in very good/good/fair health showed a compression of morbidity in the older ages for both sexes, and for rural and urban types of residence. The life expectancies without chronic morbidity for males and for urban dwellers demonstrated an expansion of morbidity. Although the life expectancy is slowly increasing, the trends in population health are contradictory, depending on the applied measures. The health expectancy indicators, based on self-perceived health, depict the actual situation in the population health. These indicators are becoming more essential with the ageing process and can be used for the tailoring of social and health policies and services to the real needs of the population.

1. Introduction

Measuring health is not an easy task. In the first place, the term of population health should be defined. The main goal of studying population health, defined by the Health Canada (1998), is to maintain and improve the health of the population and to decrease the inequalities among its people. There are several dimensions that should be taken into account: the determinants, the outcomes, the measurement and the application of health. Population health focuses on interrelated conditions and factors that influence health over the life course, the main are: individual behaviour, environment, genetics, health care services, interactions between the social environment (income, education, social support, culture) and the physical environment (urban design, clean air, water). The factors/determinants interact among them, so usually patterns of determinants are studied (Kindig, Stoddart 2003). Population health identifies the systematic variations in the patterns of health determinants, health outcomes and distribution of these in the population by using different measures. Then the knowledge is applied for the development and implementation of policies on health improvement and wellbeing. Indicators of quality of life are important for measuring and monitoring the improvements in health, controlling the health expenditures and evaluating economic costs in health care systems (Sermet, Cambois 2006).

The life expectancy (LE) at birth in the Republic of Moldova did not increase significantly during the last decades. After the dissolution of the Soviet Union, which brought a social and economic crisis, the mortality rates increased, a similar trend was observed in other post-Soviet countries (Bobadilla, Costello 1997; Penina 2014). The socioeconomic crisis had an unfavourable impact on population health too. Starting with 1998, the LE at birth faces a slow increase, due to decrease in mortality. The fivefold decrease in infant mortality rate, and threefold decrease in child mortality during 1965–2014 accounted for the decrease in the overall mortality. Even though there were significant decreases in infant and child mortality, the mortality continued to be high due to mortality among working age males aged between 30–65 years. There are differences in causes of death between males and females. The main causes of death among males are the cardiovascular diseases, neoplasms and external causes. For females, the major causes of death are cardiovascular diseases, neoplasms and infectious diseases (Population Situation Analysis 2016).

The main causes of poor health and inequalities in healthcare in the Republic of Moldova are: the underfunding of the healthcare system (chronic lack of financial resources for equipment and medication, and lack of decent remuneration in the healthcare sector), low incomes of the population (which lead to difficulties in maintaining a healthy lifestyle), reduced availability of high quality health services for the disadvantaged and vulnerable groups (Gagauz, Avram 2015a). In the Republic of Moldova population health data is included in a comprehensive statistical publication – Healthcare in the Republic of Moldova, last one was published in 2013 and covered the period 2005–2012. Each year the National Bureau of Statistics publishes the Statistical Yearbook which includes a healthcare section, where mainly the morbidity data is covered. Health data is provided by the National Centre for Health Management which is a public institution under the Ministry of Health of the Republic of Moldova. But no comprehensive and integrated indicators are used for the monitoring of the overall health. This article aims to argue that an integrated health indicator is needed, and it is possible to calculate with the available data. There are studies on mortality, but less studies on population health in the Republic of Moldova based on individual-level data, and on the subjective health and its determinants (Gagauz, Avram 2015b). This research wants to draw attention to the assessment of population health and its importance for the policies, therefore improvements in health.

For demographers, health is mostly the outcome of the duration of life, which is usually measured with incidence and prevalence rates, mortality rates, causes of death and life expectancies (Sermet, Cambois 2006). Starting with 1960 the approach on calculating population health has changed due to decrease in non-communicable diseases, thus, new indicators were needed. Blaxter (1989) proposed three models with different instruments of measuring the states of health: medical or biologic model of the disease (poor health status is defined as a divergence from a physiologic or psychological norm), social or functional model (the poor health status is defined as an inability to fulfil everyday tasks), and subjective or illness model (the measure of the subjective health). Every model requires specific data, but the same measure is used for the calculation. The most well-known and used synthetic indicators that combine mortality and morbidity are the life expectancies related to a state of health, which are called health expectancies. Health expectancies estimate the number of years, expected to be lived in a certain health status if the current patterns of mortality and self-rated morbidity/functionality limitation/self-rated health continue to apply (Robine, Jagger 2006).

For each model a health expectancy indicator is applied. The disease-free life expectancy or LE with/without chronic morbidity is utilized for the biologic model. The disability-free life expectancy is used for the functional model. For the subjective model the perceived LE indicator is applied. The most commonly used is the healthy life expectancy (HALE), which consists of the average number of years a person is expected to live in a very good or good health status, also called LE in good perceived health. There are

three theories of morbidity that explain the correlation between the evolution of the LE and the health expectancy: compression of morbidity (Fries 1983), expansion of morbidity (Gruenberg 1977; Kramer 1980; Olshansky et al. 1991) and dynamic equilibrium (Manton 1982). The theory of compression of morbidity states that while LE is increasing, morbidity is postponed to older ages. The expansion of morbidity theory states that the fatality of the chronic diseases was reduced, but not their incidence, thus, people live longer and are more prone to spend their last years with more severe chronic conditions. The concept of dynamic equilibrium means that the increase in the LE is accompanied by a slowing down in the chronic diseases. The health expectancy indicators are part of the policies of the European Union and USA. HALE is included in the core set of the European Structural Indicators. A module related to health – Minimum European Health Module, was developed for usage in social surveys and it is implemented in the European Health Interview Survey (EHIS) and EU Statistics on Income and Living Conditions (EU-SILC). The module covers all three models for measuring health. The main health goal in the European Union is to improve HALE. Moreover, the European Innovation Partnership on Active and Healthy Ageing aims to increase the average healthy lifespan of the European citizen by 2 years by 2020 (Europe 2020). These indicators are also used in Healthy People 2020, which is a science-based, 10-year national objectives for improving the health of all people from the USA. WHO has data regarding health-adjusted life expectancy for all the countries starting with the year 2000.

2. Data and methods

The concept of health expectancies as a health indicator was proposed by Sanders (Sanders 1964). The first example of calculation was presented by Sullivan (Sullivan 1971) in a report of the US Department of Health Education. The method of calculation of the morbidity-mortality tables includes data on mortality tables and on self-perceived health/self-rated morbidity rates by age from sociological surveys (Sullivan 1971). Usually period morbidity-mortality tables are constructed, which are reflecting the cross-sectional experience of individuals that belong to different

cohorts. Cohort data for morbidity-mortality tables is rarely available.

In this research the emphasis will be on the calculation of the subjective and biologic model indicators, due to the limited availability of data. For constructing morbidity-mortality tables for the Republic of Moldova we used mortality and population data (National Bureau of Statistics) and data on self-perceived health and self-reported chronic morbidity from the Household Budget Survey (HBS). The HBS is a domestic complex study, and one of the few data sources containing information on self-assessment of health and morbidity of the population by age, sex and types of residence. The survey covers all the types of households with the exception of individuals living in institutions (nursing homes, prisons etc.). The HBS is performed on a representative national sample (by sex, age and type of residence) (Table 1), and does not include the municipalities located on the left side of the Dniester River and Bender.

The self-perceived health is surveyed through the question: "How would you assess your health in general?". The levels of response are: very good, good, fair, bad and very bad. The self-rated chronic morbidity is surveyed through the question: "Do you suffer from a chronic disease?", with two levels of response: Yes/No. Healthy life expectancy (HALE) is considered the LE in very good/good/fair perceived health.) HALE and LE without chronic morbidity was calculated starting with the age 15 and ends with the age 75 for the period 2006–2015 due to availability of data. In this article we will analyse the indicators for the age 60. Males and females, and urban and rural population were analysed separately. The algorithm for the decomposition in mortality and health components proposed by Andreev, Shkolnikov, and Begun (Andreev 2002) was utilized for depicting the differences in health expectancies. A limitation of the research is depicted by the fact that the population data is overestimated due to the definition of migration used by the authorities, which does not comply with the EU recommendations (Penina 2015). The gap between the official data and alternative data is about 2.6 years for LE at birth for males, and 1.6 for females (Population Situation Analysis 2016). However, for this paper we used the official data, because the recalculated data is available only by sex, not by type of residence.

Tab. 1 The main characteristics of the samples.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total no. of respondents	12943	13334	13200	12253	11728	12041	11451	10250	11741	12332
Share of males (%)	45.1	44.7	44.3	44.8	45.7	44.7	44.6	44.2	45.6	46.1
Share of females (%)	54.9	55.3	55.7	55.2	54.3	55.3	55.4	55.8	54.4	53.9
Urban (%)	36.0	36.3	37.4	35.6	34.3	33.7	33.1	31.2	31.1	33.1
Rural (%)	64.0	63.7	62.6	64.4	65.7	66.3	66.9	68.8	68.9	66.9

Source: Authors' calculations based on the Household Budget Survey data.

3. Results

3.1 Differences by sex
The Republic of Moldova, similar to other post-Soviet countries, has lower LE and HALE compared to other European countries, according to WHO estimates (Fig. 1). The gap by sex for LE and HALE at age 60 in the some European Union countries accounts for about 4 years, and about 3 years, respectively. For post-Soviet countries the gap by sex for both LE and HALE at age 60 is slightly wider about 5 years, and 4 years, respectively.
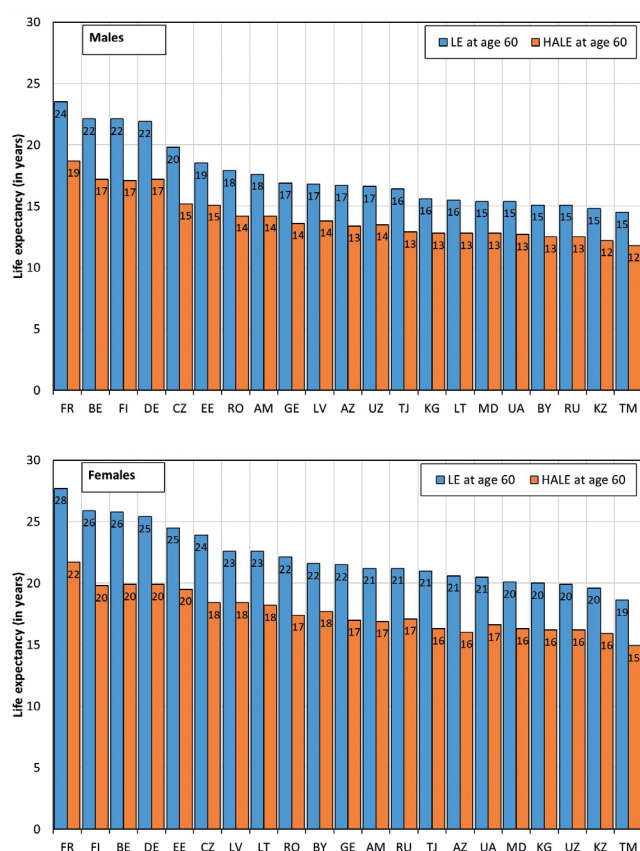

Fig. 1 LE and HALE at age 60 in post-Soviet and selected European countries, both sexes, 2015.
Note: the country names are according to the ISO 3166-1.
Source: World Health Organization.

LE at age 60 for both sexes has improved during 2006 and 2015 by approximately 1 year for males, and 2 years for females. The gap between sexes did not change significantly during the examined period, and accounted for about 4 years. The LE at age 60 in very good/good/fair perceived health has increased at a slightly higher pace than LE, therefore, the increase accounted for about 2 years for both sexes. A tendency for compression of morbidity (Fries 1980) has been observed, thus, the diseases/disabilities start to be concentrated at older ages. LE at age 60 without chronic morbidity declined. For males the LE without chronic morbidity declined by about 1.5 years. For females the decrease accounted for about 3 years. For

both sexes an expansion of the morbidity by chronic diseases is occurring (Olshansky et. al. 1991). The gap between sexes for the year 2015 regarding the LE at age 60 in very good/good/fair perceived health is about 1 year, and it did not change significantly since 2006. The gap between sexes regarding LE at age 60 without chronic morbidity is the same for 2006 and 2015, 1 year, the difference being that in 2006 the women were in better health than men, and then in 2015 vice versa (Fig. 2).

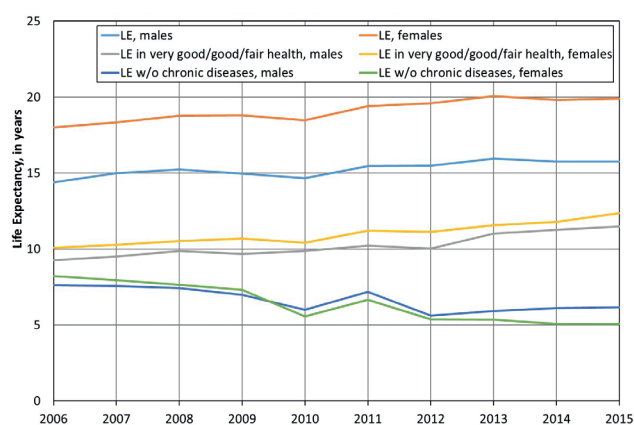The decomposition of sex differences in health expectancies in mortality and health components

Fig. 2 Dynamics of LE at age 60, LE at age 60 in very good/good/fair health and LE at age 60 w/o chronic morbidity by sex, 2006–2015.
Source: Authors' calculations based on the Household Budget Survey data.

was applied for health expectancies calculated with self-perceived health and self-reported chronic morbidity. The decomposition for LE in very good/good/fair health shows a difference of 4.37 between sexes, males are gaining 1.08 years due to better health, but lose 5.46 years due to higher mortality. The largest contribution by the good health is at the older ages: from 60–64 to 75+, but mortality is high for these ages. Thus, females gain more years due to lower mortality, but spend more time in poor health (Fig. 3). This is explained by the fact that women perceive their health worse than men, although they are having higher LE, this being called "gender and health paradox" (Nathanson 1973; Waldron 1976). When the LE without chronic diseases is analysed, a lower range between sexes is noted – in 2015 the gap accounted for 0.34 years. The range was due to gains in health for males – 3.25 years, and 2.91 years lost to higher mortality.

3.2 Differences by the type of residence
There are differences in mortality and health by the type of residence also. LE at age 60 for urban areas has improved during 2006 and 2015 by 2.2 years, and by 1.2 years for rural areas. The gap between the types of residence in 2006 accounted for about 2.5 years, and it increased up to 3.5 years in 2016. Thus, the differences between the types of residence are rising. The LE at age 60 in very good/good/ fair health has increased at
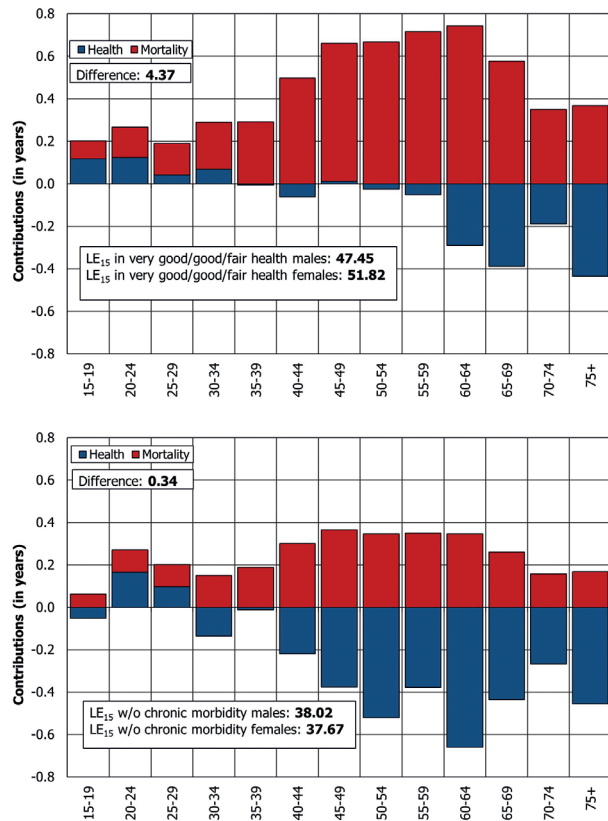
Fig. 4 Dynamics of LE at age 60, LE at age 60 in very good/good/fair health and LE at age 60 w/o chronic morbidity by the type of residence, 2006–2015.
Source: Authors' calculations based on the Household Budget Survey data.

2011). When LE without chronic diseases is analysed, a lower difference between the types of residence is distinguished, which accounts for 0.85 years. The range is determined by losses in health by the urban dwellers – 2.36 years, and gains in mortality – 1.51 years. A better health is noted for almost all the age groups from the rural areas, but the disadvantage of rural dwellers is driven by higher mortality among working age population and elderly (Fig. 5).

Fig. 3 Decomposition of differences in health expectancies (self-perceived health and self-reported chronic morbidity) between males and females, in mortality and health components, 2015.
Source: Authors' calculations based Household Budget Survey data.

a higher pace than LE, thus, with approximately 3 years for urban residents, and 2 years for rural residents. The range between the types of residence in 2006 was about 1 year, and it remained constant until the end of the examined period. For urban and rural areas we note a more significant compression of morbidity. For the LE at age 60 without chronic morbidity there is a different situation. For the urban areas this indicator has decreased by 1 year, but for the rural areas it decreased with about 3 years. According to this indicator, we note, an expansion of the morbidity. The gap between the types of residences for this indicators is decreasing, therefore, in 2006 was about 2.8 years, and in 2016 – approximately 1 year. Thus, the differences between the types of residence regarding chronic morbidity are narrowing (Fig. 4).

The decomposition of differences in health expectancies in mortality and health components by the types of residence was carried out for health expectancy calculated with self-perceived health and self-reported chronic morbidity data. The decomposition for LE in very good/good/fair health shows a difference of 2.66 years between the types of residence, the urban dwellers lose 0.49 years due to poor health, but gain 3.15 due to lower mortality. There is a high loss of years due to premature mortality in the rural areas starting with the age group 45–49 and ending with 75+, a similar trend was noted in Belarus (Grigoriev, Grigorieva
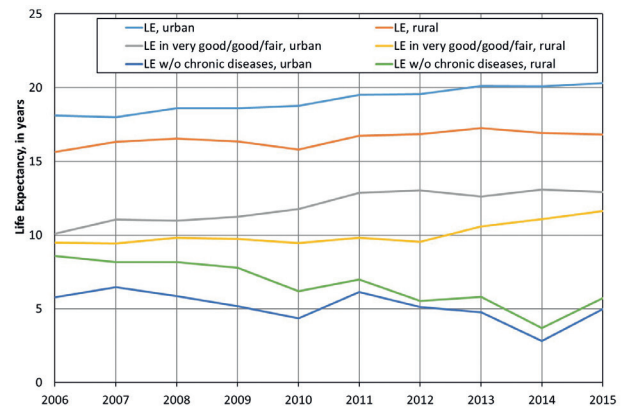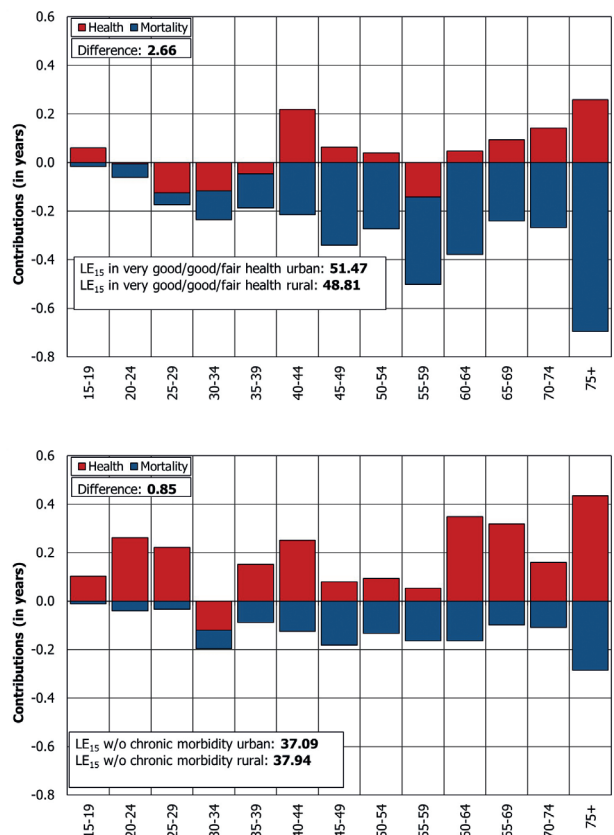

Fig. 5 Decomposition of differences in health expectancies (self-perceived health and self-reported chronic morbidity) between urban and rural areas, in mortality and health components 2015.
Source: Authors' calculations based on the Household Budget Survey data.

4. Discussions

The health expectancy indicators reflect the subjective perception of health, which is influenced by socio-economic, behavioral and psychological factors. The main purposes of the health indicators are to create an overall picture of health and to be used for monitoring trends in health. Research results on the Republic of Moldova have shown a positive trend in the evolution of health expectancies of the population calculated on self-perceived health and a odecrease in health expectancies calculated on self-rated chronic morbidity data (for the age 60). On one hand, a compression of morbidity was observed, but on the other hand, an expansion of morbidity is prevalent. We get a different result according to the model used and dimension of health analysed. The solution is to use all three models (biologic, functional and subjective) in order to accomplish a comprehensive health analysis. However, for our research we applied the biologic and subjective model, due to the availability of data. The functional model is very important due to the measurement of the physical impairments of the population, which is a concern for the healthy and active ageing. The problem is the lack of data concerning the functional limitations of the population. For improving the population health statistics, the Global Activity Limitation Indicator should be introduced, also this will be an important step to complying with the European statistics. The recommendation is to include in the Household Budget Survey questionnaire one more question along with the questions regarding the self-rated health and self-reported chronic morbidity. This question should be about the functional limitations in the daily life: e.g. "For at least the past six months, to what extent have you been limited because of a health problem in activities people usually do?" There should be three levels of response: 1- severely limited, 2-limited but not severely, 3- not limited at all. Further research is needed in order to identify the determinants of the inequalities and differences in the popualtion health and analysis of the subpopulations (by education, marital status, income etc.), also other ages should be taken into account, with a focus on elderly.

The health indicators are needed for the measurement of the efficiency of the policies and prevention of financial losses. The health indicators have been proposed as suitable for short-term allocation of social and health resourses. The calculation of health indicators is not enough, a collaboration between policy-makers and stakeholders from different fields (healthcare, education, media etc.) is required for a common formulation of the policies and health promotion. These indicators are becoming more actual and essential with the ageing, which brings a potential pressure on the health and social services. And the fact that health expectancy indicators are based on self-perception is an advantage because helps tailoring the system to the needs of the population.

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