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Original Research

Amenable mortality inequalities and their changes by place of residence during 1990–2019: the case of Lithuania

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ABSTRACT

Objective: The aim of this study was to analyze inequalities of amenable mortality by place of residence and its changes in Lithuania during 1990–2019.
Study design: A record-linked cohort study.
Methods: Information on deaths was obtained from Statistics Lithuania and the Institute of Hygiene. Mortality rates from amenable causes of death by urban and rural among men and women were calculated per 100,000 population and were standardized by age. Inequalities in mortality were assessed using rate differences. For the assessment of the trends of mortality and its inequalities during 1990–2019, joinpoint regression analysis was applied.
Results: During 1990–2019, amenable mortality of men and women in rural areas was higher compared to urban areas ($P < 0.05$). Changes in men's and women's mortality and its inequalities between rural and urban areas were characterized by three cut-off points ($P < 0.05$). However, not all the periods between the cut-off points were characterized by statistically significant changes in mortality. A reduction in amenable mortality was more evident in women, especially those living in rural areas. During 1990–2004 and in 2006, the differences in amenable mortality were greater among rural and urban women than among men. However, during 2013–2019, the differences were smaller ($P < 0.05$). Inequalities of men's mortality decreased during 1990–2001 and 2005–2012, and inequalities of women's mortality decreased during 1993–2006, 2006–2017, and 2017–2019 ($P < 0.05$). Inequalities of men's mortality decreased most rapidly during 2005–2012 (on average, by 10.24% per year), while inequalities of women's mortality decreased most rapidly during 2017–2019 (on average by 18.32% per year) ($P < 0.05$).
Conclusion: During 1990–2019, inequalities and a decline of inequalities in amenable mortality among rural and urban men and women were identified in Lithuania. The amenable mortality of the residents of Lithuania remained high, changed unevenly, and no significant sharp decrease was observed. Further reduction of inequalities in amenable mortality between rural and urban inhabitants with a special focus on men remain the health policy challenges in Lithuania.

Introduction

Evaluation of the efficiency of healthcare systems in the countries of the European Union (EU) is becoming increasingly important,[1] with a particular focus on access to, equity, efficiency, and effectiveness of healthcare. Amenable mortality is often used to assess these components. Amenable mortality is defined as deaths that can be avoided through timely and effective healthcare interventions, including secondary prevention and treatment.[2]

Amenable mortality indirectly demonstrates the efficiency and quality of the healthcare system. With a high-quality and efficient healthcare system, up to 40% of deaths can be prevented;[3] thus, life expectancy can be increased. It has been observed that the higher the share of GDP spent on healthcare, the lower amenable mortality rates are registered.[4,5] In Lithuania, healthcare outcomes and healthcare expenditures are among the lowest in the EU, while mortality from amenable causes of death is one of the highest.[3]

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Compared to other EU countries, Lithuania and other Eastern European countries stand out due to significant health inequalities of the population.[4,6] These inequalities are caused by various demographic, social, economic, environmental, political, and other health-determining factors.[7–17] In Lithuania, the place of residence is of particular importance for the health of the population due to differences in physical and social environment, as well as the availability, accessibility, and quality of healthcare and social services.[18–20] The rural population has a more favorable physical environment (less polluted air, less noise, and more green spaces), yet due to poorer lifestyles[12,13] and limited availability of quality healthcare services their health is poorer,[18–20] mortality is higher, and life expectancy is shorter compared to the urban population.[21] Although significant territorial inequalities in public health and healthcare services are slowly decreasing, they remain at a quite prominent level.

Lithuania, along with other countries, pays great attention to the reduction of health inequalities. The main goal of the Lithuanian Health Strategy 2014–2025 is the attainment of improved health of the Lithuanian population, as well as reduced mortality rates and increased life expectancy.[22] Since 2014, even greater attention has been paid to reducing health inequalities in Lithuania with the Action Plan for Reducing Health Inequalities being implemented.[23] It aims to reduce the gaps in health inequalities and access to healthcare across regions and social groups.

Although there are studies in Lithuania that have examined amenable mortality, yet inequalities by place of residence and changes in these inequalities over a 30-year period have not been analyzed so far. In this study, we used the list of amenable causes of death developed by Nolte and McKee, which is one of the most commonly used tools worldwide.[24]

Thus, the aim of this study was to analyze inequalities of amenable mortality and their changes by place of residence in Lithuania during 1990–2019.

Methods

Data sources

Information on deaths among Lithuanian men and women in urban and rural areas was obtained from the State Register of Death Cases and Their Causes. The average annual population for the period of 1990–2019 was obtained from the Database of Indicators of the Lithuanian Department of Statistics.[25]

Population

In Lithuania, 1,254,430 people died during the study period (of these, 286,885 died from amenable causes). The population size was declining throughout the period under investigation, from 3.7 to 2.8 million people (in urban areas, from 2.5 to 1.9 million people, and in rural areas, from 1.2 to 0.9 million people). More detailed information about the population and deaths from amenable causes by place of residence and by sex during 1990–2019 is presented in the Supplementary Material (Tables S1 and S2).

The amenable causes of death and the corresponding ICD codes are presented in Table 1. The amenable causes of death were chosen from the list developed by Nolte and McKee.[24] These causes of death are used in many other studies as amenable causes of death.[26–30]

The data were analyzed with respect to the place of residence and sex. Urban and rural populations were categorized on the basis of the classification provided by the Lithuanian Department of Statistics; the categorization was as follows: (1) urban population refers to those persons who live in cities and towns, i.e. in the population areas with closely built permanent dwellings and with the resident population of more than 3000; (2) rural population refers to those persons who live in the population areas without any signs of a town or a city (small towns, villages, and steadings).[31]

Statistical analysis

The rates of mortality from the analyzed causes for men and women were calculated by the place of residence (urban or rural) per 100,000 population. Mortality rates were age-standardized using the European Standard Population (1976) as recommended by the WHO.

Changes in the magnitude of mortality inequalities by place of residence were assessed using the easily interpretable measure of absolute (rate difference (RD) of mortality = rural-urban) terms with its 95% confidence intervals (CI). The difference in mortality change between the rural and urban areas was calculated as (age-standardized mortality rate $(ASRM)_{2019,\ rural} - ASMR_{1990,\ rural}) - (ASMR_{2019,\ urban} - ASMR_{1990,\ urban})$. Changes in absolute inequalities were calculated as follows: $100 \times (RD_{2019} - RD_{1990}) \div RD_{1990}$.

For the assessment of inequality trends (as differences in mortality) during 1990–2019, the joinpoint regression analysis was applied. Joinpoint regression is a Windows-based statistical software program that enables a user to test the statistical significance of an apparent change in a trend. In this analysis, the best-fitting points, wherein the rate significantly increases or decreases, were chosen.[32] The analysis started with a minimum number of joinpoints, testing whether one or more cut-off points were statistically significant and whether they could be added to the model. In the final model, each joinpoint indicated a statistically significant change in a trend; the annual percentage change for each of those trends was then calculated. For the joinpoint analysis, the overall significance level was set at $P = 0.05$. Significant changes included changes in the direction or rate of the trend. The permutation test (i.e., testing the number of joinpoints 0 against 3) was used in this case. Coefficients of regression multiplied by 100 were presented as average annual changes, which were statistically significant at $P < 0.05$. This methodology allowed for identifying inequalities of amenable mortality and its changes by place of residence in Lithuania during 1990–2019.

Results

The proportional mortality (%) of Lithuanian men and women in urban and rural areas in 1990 and 2019 is presented in Table 2. During the analyzed period, amenable mortality of men in urban and rural areas accounted for a larger share in the structure of the causes of death than that of women. In 2019, amenable mortality in men and women accounted for a smaller share in the structure of the causes of death than in 1990.

During 1990–2019, amenable mortality of men and women was lower in urban areas than that in rural areas ($P < 0.05$) (Figs. 1 and 2). During the analyzed period, mortality of men in urban areas ranged from 227.2 (95% CI: 218.63; 235.77) in 1990 to 395.11/100,000 pop. (95% CI: 382.68; 407.54) in 2007, and in rural areas – from 412.89 (95% CI: 396.06; 429.72) in 2000 to 559.80/100,000 pop. (95% CI: 539.50; 580.09) in 2007 (Table S3). From 1990 to 2019, differences in changes in amenable mortality between rural and urban areas of Lithuania decreased by 59.99/100,000 pop.

Joinpoint regression analysis disclosed that mortality of men in urban and rural areas changed unevenly during the study period: three cut-off points were found, yet not all the periods between the cut-off points were characterized by statistically significant changes in amenable mortality (Fig. 1). In urban areas, mortality changed statistically significantly during 1990–1993, 2000–2006,

Table 1
Amenable causes of death and the corresponding codes of the International Classification of Diseases (ICD).

Disease categories	Causes of death	Age	Short ICD-9 (1990–1992)	ICD-9 (1993–1997)	ICD-10 (From 1998)
Infections	Intestinal infections	0–14	1–8	001–9	A00-A09
	Tuberculosis	0–74	9-13, 43	010-8, 137	A15-A19, B90
	Other infections (diphtheria, tetanus, poliomyelitis)	0–74	18, 24, 27	032, 037, 045	A35, A36, A80
	Whooping cough	0–14	19	033	A37
	Septicemia	0–74	25	038	A40-A41
	Measles	1–14	28	055	B05
Neoplasms	Malignant neoplasm of colon and rectum	0–74	49–50	153–4	C18–C21
	Malignant neoplasm of skin	0–74	56	173	C44
	Malignant neoplasm of breast	0–74	57	174	C50
	Malignant neoplasm of cervix uteri	0–74	58	180	C53
	Malignant neoplasm of cervix uteri and body of uterus	0–44	59	179, 182	C54, C55
	Malignant neoplasm of testis	0–74	62	186	C62
	Hodgkin's disease	0–74	66	201	C81
	Leukemia	0–44	65	204–8	C91–C95
Nutritional, endocrine, and metabolic diseases	Diseases of the thyroid	0–74	69	240–6	E00-E07
	Diabetes mellitus	0–49	68	250	E10-E14
Neurologic disorders	Epilepsy	0–74	81	345	G40-G41
Cardiovascular diseases	Chronic rheumatic heart disease	0–74	85	393–8	I05–I09
	Hypertensive disease	0–74	86–89	401–5	I10–I13, I15
	Cerebrovascular disease	0–74	98–99	430–8	I60–I69
	Ischemic heart disease	0–74	90–95	410–4	I20–I25
Diseases of the respiratory system	All respiratory diseases (excluding pneumonia and influenza)	1–14	103, 108-114	460–79, 488–519	J00–J09, J20–J99
	Influenza	0–74	104	487	J10–J11
	Pneumonia	0–74	105–107	480–6	J12–J18
Diseases of the digestive system	Peptic ulcer	0–74	115–116	531–3	K25–K27
	Appendicitis	0–74	118	540–3	K35–K38
	Abdominal hernia	0–74	111	550–3	K40–K46
	Cholelithiasis and cholecystitis	0–74	124	574–5,1	K80–K81
Diseases of the Genitourinary system	Nephritis and nephrosis	0–74	128–129	580–9	N00–N07, N17–N19, N25–N27
	Benign prostatic hyperplasia	0–74	133	600	N40
Pregnancy, childbirth, and the puerperium	Maternal death	All	135–141	630–76	O00–O99
Certain conditions originating in the perinatal period	Perinatal deaths, all causes, excluding stillbirths	All	151–157	760–79	P00–P96, A33
Congenital malformations, deformations, and chromosomal abnormalities	Congenital cardiovascular anomalies	0–74	147–148	745–7	Q20–Q28
External causes	Misadventures to patients during surgical and medical care	All	165	E870–6, E878–9	Y60–Y69, Y83–Y84

and 2006–2019. During 1990–1993 and 2000–2006, mortality increased, respectively, from 227.20 to 279.74/100000 pop. (on average, by 7.82% per year), and from 276.11 to 387.13/100,000 pop. (on average, by 5.72% per year). However, mortality decreased from 387.13 to 328.67/100,000 pop. (on average, by 0.89% per year) during 2006–2019.

Mortality changed statistically significantly in rural areas during all the periods between the cut-off points. During 1990–1993 and 2000–2005, mortality increased statistically significantly – respectively, from 421.48 to 534.28/100,000 pop. (on average, by 9.00% per year), and from 412.89 to 559.80/100,000 pop. (on average, by 5.27% per year). However, during 1993–2000 and 2005–2019, mortality decreased – respectively, from 534.28 to 412.89/100,000 pop. (on average by 3.44% per year), and from 559.80 to 462.96/100,000 pop. (on average by 1.51% per year). More detailed indicators of amenable mortality in men along with critical mortality periods are presented in the Supplementary material (Tables S3 and S4).

During the analyzed period, amenable mortality of women in urban areas ranged from 175.17 (95% CI: 168.07; 182.26) in 1990 to 267.41/100,000 pop. (95% CI: 258.09; 276.74) in 2007; in rural areas, it ranged from 256.41 (95% CI: 241.92; 270.91) in 2018 to 540.78/100,000 pop. (95% CI: 522.48; 559.08) in 1995 (Table S3). From 1990 to 2019, differences in changes in amenable mortality between rural and urban areas of Lithuania decreased by 190.94/100,000 pop.

Amenable mortality of women in urban and rural areas changed unevenly during 1990–2019: three cut-off points were found. However, not during all the periods between the cut-off points the changes in mortality were statistically significant (Fig. 2).

In urban areas, amenable mortality increased statistically significantly during 1990–1995, 2000–2008, and 2008–2019.

Table 2
Proportional mortality (%) by place of residence and sex in Lithuania in 1990 and 2019.

Causes of death	Men				Women			
	1990		2019		1990		2019	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Amenable	32.75	25.31	21.31	23.64	25.71	20.53	12.17	11.96
Others	67.25	74.69	78.69	76.36	74.29	79.47	87.83	88.04
All causes of death	100	100	100	100	100	100	100	100

During 1990–1995 and 2000–2008, mortality increased, respectively, from 175.17 to 247.74/100,000 pop. (on average, by 7.04% per year), and from 220.82 to 266.72/100,000 pop. (on average, by 2.38% per year). However, during 2008–2019, mortality decreased from 266.72 to 227.19/100,000 pop. (on average, by 1.53% per year).

In rural areas, it was only during 1990–1994 that mortality increased statistically significantly – from 404.45 to 535.48/100,000 pop. (on average, by 8.35% per year). However, during 1994–2001 and 2006–2019, mortality decreased statistically significantly – from 535.48 to 430.52/100,000 pop. (on average, by 3.19% per year), and from 450.63 to 265.53/100,000 pop. (on average, by 3.99% per year).

More detailed indicators of amenable mortality in women along with critical mortality periods are presented in the Supplementary material (Tables S3 and S4).

Differences of amenable mortality of men in rural and urban areas ranged between 87.23 (95% CI: 80.61; 93.84) in 2013 and 254.54/100,000 pop. (95% CI: 245.10; 263.99) in 1993, while amenable mortality of women ranged between 34.14 (95% CI: 28.71; 39.58) in 2018 and 314.33/100,000 pop. (95% CI: 304.13; 324.53) in 1993 (Table S3).

During 1990–2004 and in 2006, the differences in the rates of amenable mortality of women in rural and urban areas were greater than those of men, but they were smaller during 2014–2019 (Table S3). Changes in differences in amenable mortality in women between 1990 and 2019 decreased by 30.88%, and in men – by 83.28%.

Joinpoint regression analysis showed that inequalities in amenable mortality rates between men and women in rural and urban areas varied unevenly during 1990–2019: three statistically significant cut-off points were found, yet in men, not all the periods between the cut-off points were characterized by statistically significant changes in amenable mortality (Fig. 3).

Differences in men's amenable mortality rates varied statistically significantly during 1990–2001 and 2005–2012. During both periods, the differences in rates decreased, respectively, from 194.28 to 148.74/100,000 pop. (on average, by 3.97% per year) and from 193.27 to 87.26/100,000 pop. (on average, by 10.24% per year).

Differences in women's amenable mortality rates varied statistically significantly during all the periods between the cut-off points. Differences in mortality increased only during 1990–1993 – from 229.28 to 314.33/100,000 pop. (on average, by 12.20% per year). During 1993–2006, 2006–2017, and 2017–2019, differences in mortality rates decreased, respectively, from 314.33 to 193.95/100,000 pop. (on average, by 4.12% per year), from 193.95 to 63.39/100,000 pop. (on average, by 10.71% per year) and from 63.39 to 38.34/100,000 pop. (on average, by 18.32% per year).

More detailed information on differences in amenable mortality rates in men and women in rural and urban areas, along with critical periods of mortality, are presented in the Supplementary material (Tables S3 and S4).

Discussion

According to the World Health Organization, Lithuania has one of the highest overall mortality rates in the EU,[33] as well as high amenable mortality rates.[1] Although amenable mortality in Lithuania is decreasing, it was the second-highest in the EU, and by 2.2 times higher than the EU average in 2016 (most recent available data).[3] Higher mortality rates are observed in countries that have undergone intense social, economic, and political changes, and that theyspend less on healthcare.[34]

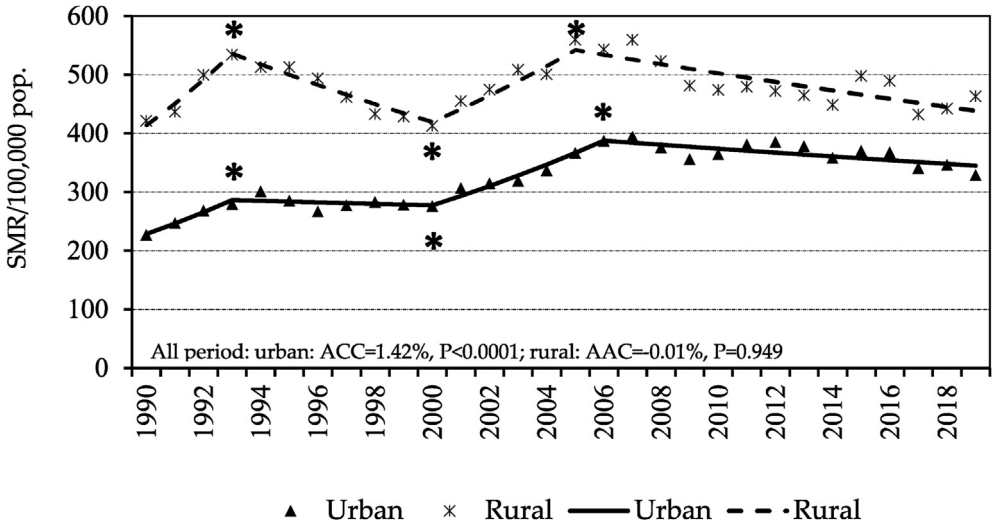

Fig. 1. Age-standardized amenable mortality of men and its cut-off points in Lithuania during 1990–2019.

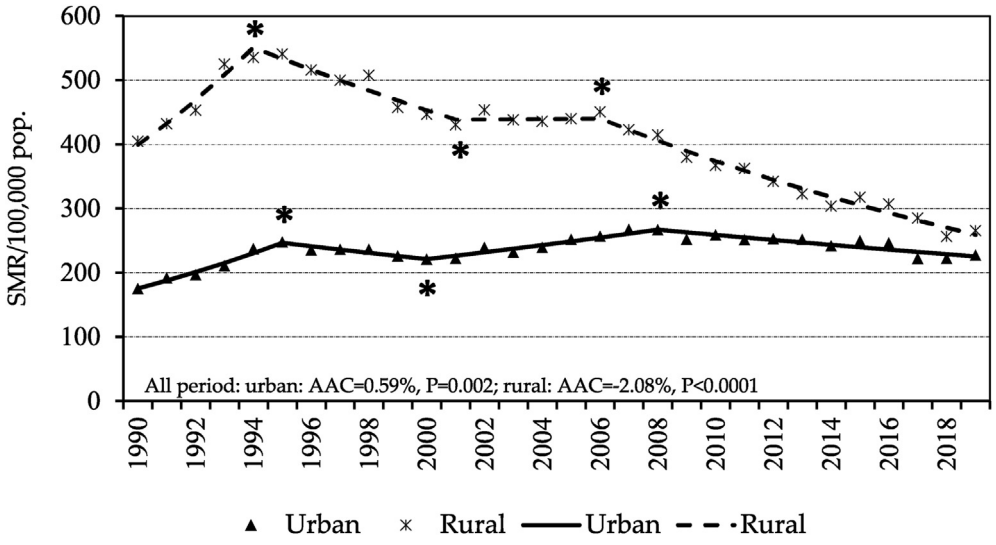

Fig. 2. Age-standardized amenable mortality of women and its cut-off points in Lithuania during 1990–2019.

In Lithuania, health expenditures are among the lowest in the EU.[33] Although the expenditures on health in Lithuania are increasing, in 2017, they accounted for only 6.5% of the GDP (the EU average is 9.8%).[33] In Lithuania, health expenditures per capita were lower almost by half (€ 1605) compared those in the EU (€ 2884). In addition, only about two-thirds (67%) of health expenditures are financed by the state, which is much less than the EU average (79%). The remaining third of health expenditures are covered by patients' co-payments, which is one of the highest proportions in the EU.[4]

Although the overall availability of healthcare services in Lithuania is good and the population indicates that the level of unsatisfied medical needs is low,[4] the results of the study clearly showed that people living in rural areas still faced greater problems because amenable mortality was higher compared to the urban population.

These inequalities indirectly reflect the greater social and psychological stress experienced by the rural population due to social and cultural factors that are unfavorable to health, as well as due to healthcare inequalities: access to high-quality preventive, outpatient, and inpatient services is more difficult and time-consuming for the rural population than it is for the urban population. This is related to the unequal distribution of specialists and shortcomings in the efficiency, timeliness of organization, and proper management of healthcare services. Lithuanian regions lag behind major cities in social and economic development. Also, the lifestyle and health literacy of the rural population is poorer, and rural people are more likely to face financial problems.[19] According to the Lithuanian Department of Statistics, the at-risk-of-poverty rate in rural areas is significantly higher than that in urban areas.[19] In 2019, as much as 27.9% of the rural population lived at risk of poverty (compared to 17% in urban areas), and also a higher unemployment rate was observed in rural areas (8.5% compared to 5.3% in urban areas). In addition, the disposable income of one rural household was lower by 38.5% compared to urban areas, and 5.7% of those

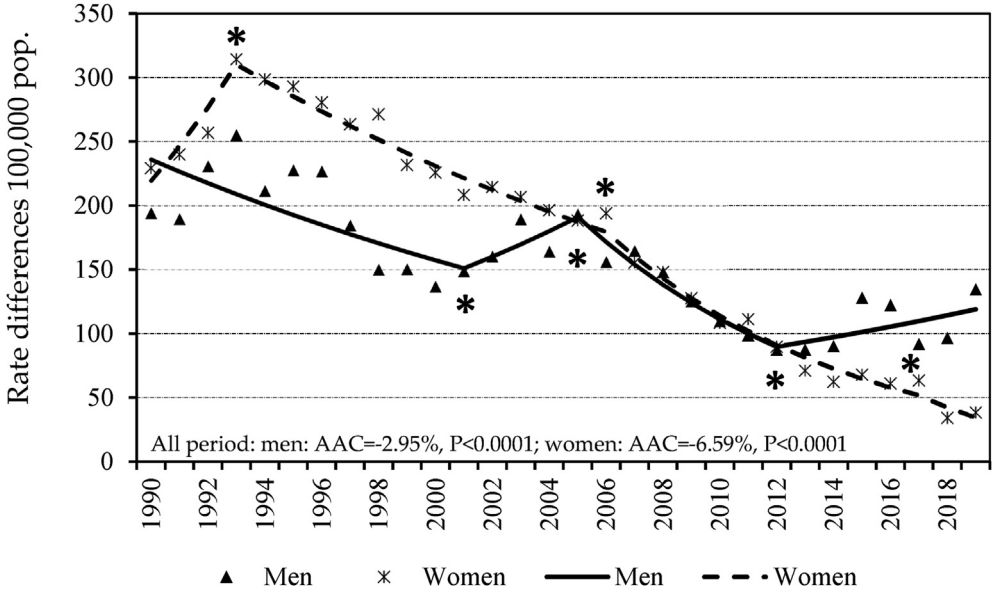

Fig. 3. Differences in amenable mortality rates between men and women in rural and urban areas and critical periods in Lithuania during 1990–2019.

living in rural areas faced severe material deprivation. The quality of housing in urban and rural areas also differed significantly in Lithuania. In rural areas, as much as 24% of the population live in dwellings without a flush toilet, and 21% live without a bath or a shower (compared to, respectively, 3% and 4% in urban areas). In addition, the rural population leads a worse lifestyle (they consume alcohol and smoke more often), and a smaller part of the population consult a family physician or a specialist due to health problems.[10,13,19] All these negative factors lead to poorer health and higher mortality rates of the rural population. High mortality rates of the rural population suggest that it is necessary to develop a more effective public health policy in Lithuania, reform the healthcare system, and invest in the improvement of its quality.

Our study also showed that throughout the analyzed period, the amenable mortality of men and women in urban and rural areas was characterized by large fluctuations. Mortality curves can be divided into four periods (increase-decrease-increase-decrease). The study showed that amenable mortality changed in similar directions as the overall mortality of the Lithuanian population did.[21]

The increase in mortality during the first period was associated with Lithuania's transition from one political economic system to another. During this period, Lithuania underwent a change in the country's system, the creation of a market economy, the loss of a stable social status of some people, unemployment, growing social inequality, and at the same time, tensions in the society. Sudden socio-economic changes in postcommunist countries led to a health crisis, which manifested itself primarily through an increase in the mortality of the population from many diseases and a decrease in life expectancy.[25,33,35]

During the third period of changes in mortality rates (around 2000–2008), life expectancy shortened again due to an increase in amenable mortality, as well as in overall mortality.[21] It was noticed that of all the EU countries, only Lithuania demonstrated a negative mortality trend.[33]

We do not know what causes of death were responsible for the increase in amenable mortality due to the lack of studies on the issue, and the available data in the Hygiene Institute database do not allow for identifying the exact causes of death because the mortality rates provided in this database were calculated for other age groups.[21] However, regardless of age groups, mortality was found to increase from tuberculosis, melanoma, pneumonia, diabetes mellitus, and other diseases.[21] During this period, the mortality rates were particularly high among widowers, the uneducated, and rural men, which influenced high mortality rates in the country as a whole.[36,37]

After the unfavorable period, our study showed positive changes in mortality in both sexes in urban as well as in rural areas. These positive developments may have been driven, albeit a bit later than in other EU countries, by preventive programs and other activities that reduce the frequency of diseases and conditions that are on the list of amenable mortality, such as screening programs for breast, colorectal, and cervical cancer,[38–40] the inclusion of the vaccination of 11-year-old girls against human papillomavirus in the childhood vaccination schedule (in 2016),[41] free vaccination against seasonal influenza in the elderly and other vulnerable groups,[42] tuberculosis screening,[43] a cardiovascular program[44] and a health promotion program for people at risk of cardiovascular diseases and diabetes, and lifestyle training programs.[45] However, although the screening coverage of target groups has increased over the last decade, it is still below the EU average.[4]

One of the limitations of our study is the difficulties in comparing the results of our study with other similar studies due to variability in lists of amenable causes of death. We used one of the most common lists developed by Nolte and McKee.[24] Nevertheless, the use of different lists[46,47] of amenable diseases might have revealed different trends in amenable mortality. Another limitation of the study is that we did not follow the recommendation by Nolte and McKee to include only 50% of deaths from ischemic heart disease as this disease depends not only on medical interventions (the quality of intensive care, timely patient transportation, and effective medical interventions) but also on human lifestyle and other factors.[24,46] According to the data of the Institute of Hygiene, this cause of death is tended to be overdiagnosed in Lithuania.[48] However, the percentage of the overdiagnosis of this disease is found to range from 8 to 20%.[48,49] Therefore, we decided to ignore the recommendation by Nolte and McKee and included all deaths from this disease in our analysis. The potential of overdiagnosis of ischemic heart disease might have increased the rates of inequalities between rural and urban areas. Nevertheless, we believe that the inclusion of 100% of cases of death from ischemic heart diseases had no significant effect on the trends in amenable mortality derived from joinpoint analysis.

Our study showed that the differences between rural and urban areas were the greatest after the restoration of Lithuania's independence. Differences in amenable mortality between men and women by place of residence decreased unevenly (except for the last period for men). A faster decline in differences in mortality was observed among women. However, it is expected that the Lithuanian Health Strategy for 2014–2025[22] and the inequality reduction program[23] will help reduce health inequalities, and inequalities in mortality will decrease more rapidly.

Conclusions

During 1990–2019, amenable mortality of Lithuanian men and women was greater in rural areas than in urban areas. During the study period, amenable mortality in urban residents increased, while that of rural women decreased. Only a declining trend was found among rural men.

During 1990–2004 and in 2006, differences of amenable mortality in women in rural and urban areas were greater than those in men, but they were smaller during 2013–2019. Differences in men's mortality decreased during 1990–2001 and 2005–2012, whereas differences in women's mortality decreased during 1993–2006, 2006–2017, and 2017–2019. However, differences in women's mortality increased during 1990–1993. Amenable inequalities in mortality among men decreased most rapidly during 2005–2012 (on average, by 10.24% per year), and those among women – during 2017–2019 (on average, by 18.32% per year) ($P < 0.05$).

Summing up, during 1990–2019, amenable mortality of the residents of Lithuania remained high, changed very unevenly, and no significant sharp decrease was observed. Amenable mortality was also greater in rural areas than in urban areas, although rural/urban inequalities tended to decrease. This proves the great importance of not only further improvement of the quality of healthcare services, but also significant strengthening of the prevention of diseases, early diagnostics, and health promotion in the Lithuanian population (paying special attention to the rural population), which could undoubtedly reduce amenable mortality and its inequalities in the country.

Author statements

Ethical approval

Not required, because only the aggregated data were used for this study.

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None.

Competing interests

None declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2021.09.022.

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Original Research

Differences in health literacy level of patients from public and private hospitals: a cross-sectional study in Turkey

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ABSTRACT

Objectives: Policy-making based on a health literacy approach makes it a priority to develop people-centered public health strategies and programs, particularly in the time of COVID-19 across the world. This is the first study to assess health literacy levels of patients visiting public and private hospitals in Turkey and also compares these levels with sociodemographic and health-related variables by hospital type to suggest health policies aimed at improving the health literacy skills for patients with different socio-economic backgrounds.
Study design: This is a cross-sectional study.
Methods: The study was conducted on 948 outpatients from both hospital types in 2018. Health literacy was assessed using the validated Turkish version of the European Health Literacy Survey Questionnaire with 47 items. The level of health literacy and sociodemographic factors influencing it were analyzed using correlation and binary logistic regression tests. Patients from private hospital had better health literacy index score compared with the public hospital.
Results: The health-related variables, such as self-reported health and the presence of long-term illness, and sociodemographic characteristics, including education, age, and gender, were associated with health literacy for both public and private hospitals. Age and education were important predictors, whereas gender, long-term disease condition, self-reported health, and perceived income status were statistically significant variables for adequate health literacy in both hospital types.
Conclusions: Participants from private hospital had better health literacy than that of public hospital. These findings could be used to help health policy makers to improve the current health literacy policy for patients and develop strategies by stakeholders for reducing barriers to obtaining health-related information.

Introduction

Health literacy has been addressed in various studies as a range of skills individuals need to access, understand, and use basic health information to obtain better health outcomes.[1–3] Some studies expand the scope of health literacy to focus on patient-centered communication, disease prevention, and health-related behaviors.[4,5] The concept of health literacy seems to be very flexible, and more than 250 different definitions exist in the academic literature.[6] However, a widely accepted definition[7] of health literacy from the US Institute of Medicine is that the degree to which each person has the ability to acquire, interpret, and understand simple health information and services needed to make appropriate health decisions.[8] As included in most current definitions, this definition focuses on defining health literacy as an individual skill or ability. However, there is a growing recognition that health literacy is not solely an individual characteristic but also two sided, which means the possible contributions of those responsible for providing health information or of the attributes of health and health care settings.[9]

Although limited research has been done so far on health literacy for patients in Turkey, the importance of the issue is increasingly recognized in international health policy development.[10] Particularly, in the COVID-19 pandemic, efforts of health authorities and governments to improve health literacy for people can significantly help to reduce the infection transmission rate and to control the disease. Applying protective measures against infection with coronavirus, understanding of public health

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recommendations for mitigating the spread of COVID-19, and navigating COVID-19-related health information environments are currently of elevated importance.[11] A recent study have shown that higher health literacy levels have shown protective effects against COVID-19-related depression.[12] From this point, the present study will contribute to creating evidence on health literacy, especially in the time of COVID-19.

The purpose of the present study is to investigate the health literacy level of the adult patients from both types of hospitals where they are provided health care services in the same region. As each patient receiving health care service from these hospitals is different, the relationship between sociodemographic characteristics and health literacy will help identify vulnerable individuals with limited health literacy who are likely at risk for poorer health outcomes.[13] The research questions of this study, therefore, are (1) what are the differences in health literacy levels for patients receiving health care from private and public hospital, (2) to what extent are sociodemographic and health-related characteristics associated with the patients' health literacy level, and (3) to what extent do self-reported health predict health literacy by hospital type. As income-related equity in health literacy represents a potential opportunity to improve health outcomes,[14] it is also formulated the following research question: what extent do perceived income status predict health literacy of participants in both hospital types?

Methods

Study design and setting

The study was conducted on two different types of hospitals (public and private hospitals) with selecting a simple random sample of secondary healthcare services without replacement on the west side of Istanbul, Turkey, by using a cross-sectional descriptive approach. These hospitals were selected by assigning a random number to each hospital in sampling frame without biased regard to specific location or hospital organizational structure. Each hospital has the same probability of being chosen. In Turkey, public hospitals constitute 58% of all hospitals and 61% of all beds.[15] Approximately two-thirds of private hospitals in Turkey are located in Istanbul. There are slight differences in both hospital types with respect to the organizational and management characteristics. Private hospitals, predominantly profit-making organizations, are primarily funded by out-of-pocket payments and private insurances. Public hospitals, however, which operate with limited financial and management autonomy, are financed from both revolving funds and a line-item budget. Several studies in Turkey have shown that people with better socio-economic status primarily preferred private hospitals to receive quality healthcare services.[16–18] Private hospitals offer higher service quality and patient satisfaction level compared with public hospitals; however, a limited percentage of Turkish citizens can afford to use them.[17] These factors make two types of hospital-based patients receiving health care. Therefore, there is a crucial need to understand the correlates of health literacy levels between both types of patients to implement health policies aimed at reducing the differences in health literacy level for patients from both types of hospitals.

In both hospitals, the outpatient participants, visiting a hospital only for the medical treatment without staying there overnight, were asked to complete a 54-question survey about health literacy and sociodemographic characteristics. Only these participants who met inclusion criteria and were willing to participate in the study were included. Data were collected from outpatients visiting both hospitals from January to September 2018. By the end of the survey period, a total of 992 participants completed the survey, and 44 individuals were excluded from the study because they could not meet the inclusion criteria, skewed responses, or missing values. Finally, for the analysis, 948 participants were included in the study.

Characteristics and measurements

The instrument consists of two parts. First, the sociodemographic and health-related characteristics were collected from the questionnaire with seven items, such as gender, age, marital status, education level, self-reported health, long-term illnesses, and perceived income status. Second, health literacy was measured using the validated Turkish version of the European Health Literacy Survey Questionnaire (HLS-EU-Q47) with 47 items.[19]

The HLS-EU-Q47 is a conceptual model covering three health-related domains, such as health care, disease prevention, and health promotion. Within these domains, four cognitive skills focused on (1) accessing, or the ability to find and obtain information on health (13 items); (2) understanding, or the ability to comprehend information on health (11 items); (3) appraising, or the ability to evaluate and interpret information on health (12 items); and (4) applying, or the ability to use the information to improve health outcomes and health service responsiveness (11 items). Finally, all items constitute a general health literacy index providing a general picture and overview. The total score that can be obtained from the survey is between 47 and 188. To enable convenient calculations, the mean values of each index were standardized on a metric between 0 and 50 as in the HLS-EU study. The following formula retrieved from the report on health literacy[20] was used for this.

$$Index\ score = (Mean - 1) \times \left(\frac{50}{3}\right)$$

In this formula, mean is the mean of all participating items for each individual, 1 is the minimal possible value of the mean, 3 is the range of the mean, and 50 is the chosen maximum value of the new metric. The index score is categorized into four levels of health literacy: "inadequate" ($\leq$25), "problematic" (>25 to $\leq$ 33), "sufficient" (>33 to $\leq$ 42), and "excellent" (>42).

As provided in previous studies,[20,21] 47 items from a questionnaire were assessed using a 4-point rating scale with response categories ranging from very easy (4) to very difficult (1) to measure the perceived difficulty of the selected health-relevant tasks. In the present study, higher scores indicate better health literacy. Threshold values were defined as inadequate, problematic (which together also showed limited health literacy), sufficient, and excellent. The HLS-EU-Q47 refers to a self-perceived measure of health literacy and reflects the interactions between individual competencies and situational complexities or demands.[22] This should be taken into account when interpreting the survey results.

Statistical analysis

Sociodemographic characteristics and health-related variables difference among general health literacy were compared between hospitals using the Chi-squared test. Spearmen's significance test was performed to assess associations between health literacy and various variables, all non-parametric data. Descriptive analysis was conducted for the description of the mean scores and standard deviation of all the variables. Finally, binary logistic regression analyses were used to examine the extent to which various independent covariates may predict health literacy as dichotomized variables. In these analyses, inadequate and problematic health

literacy levels (limited health literacy) were coded as '0', and sufficient and excellent health literacy levels (adequate health literacy) were coded as '1'.

For the multivariate analyses, two models were used. The first model included gender, age, education, and long-term illnesses. The second model consisted of the first model plus self-reported health because of the mediating role of health literacy. Each model and analysis were performed for hospitals separately. To show a holistic view of the relationships, all variables were included in the models except for variable of marital status, indicating a weak relationship with the outcome variable. Finally, both types of hospitals were included in overall analysis of health literacy. The Hosmer–Lemeshow test was used to evaluate the goodness of fit for all models. The predictive strength of models was assessed using the Nagelkerke R-square. The results were presented as odds ratios with 95% confidence intervals (CIs) and p value. A p value of <0.05 was considered statistically significant, and all analyses were two sided. Data were analyzed using the IBM SPSS statistics 26 (Chicago, IL).

Results

Participant characteristics

Detailed characteristics and variables for the study population were presented in Table 1. Approximately half (53.1%) of the participants were females, and the average age of respondents was 38 years (±11 years). Most participants were aged <45 years from the public hospital and private hospital with a rate of 62% and 61.6%, respectively. Approximately two-thirds of respondents (64.6%) were married. Although more than half of participants (51.5%) from the public hospital were under the high school level, it was less than a half (44.9%) for a private hospital. Participants having inadequate perceived income status was significantly higher in public hospital (61.1%) than those in private hospital (44.7%, $P = 0.003$).

Distribution of health literacy by hospital

From the data in Table 2, most respondents from both hospitals generally had limited health literacy, although a higher percentage of the private hospital had sufficient and excellent health literacy levels (41%) compared with a public hospital (35.5%). Despite different participation rates, there were significant differences in the distributions of health literacy indices between hospitals. Moreover, these results indicated that limited health literacy was a serious problem mostly for participants from the public hospital (64.5%) compared with the private one (59%).

Factors associated with health literacy

From the Spearman correlation matrix (Table 3), general health literacy was correlated with some demographic and health-related variables, such as gender, age, education level, long-term illnesses, and self-reported health status. Although age was inversely and weak correlated ($r = -0.22$; $P < 0.01$) with general health literacy, the strongest association was with education ($r = 0.52$; $P < 0.01$), with higher education indicating higher health literacy. Lower

Table 1
Characteristics of the study participants.

Variables	Total (n = 948)	Public hospital (n = 492)	Private hospital (n = 456)	p value
	n (%)	n (%)	n (%)	
Gender				**0.025**
Male	445 (46.9)	219 (44.5)	226 (49.6)	
Female	503 (53.1)	273 (55.5)	230 (50.4)	
Age groups (years)				**0.005**
18–24	173 (18.2)	96 (19.5)	77 (16.9)	
25–34	211 (22.2)	111 (22.6)	100 (21.9)	
35–44	202 (21.3)	98 (19.9)	104 (22.8)	
45–54	154 (16.2)	75 (15.2)	79 (17.3)	
55–64	123 (12.9)	68 (13.8)	55 (12.1)	
≥65	85 (9.2)	44 (8.9)	41 (9.0)	
Mean (SD)	38.4 (±11.8)			
Education				**<0.001**
Literate	233 (24.6)	139 (28.3)	94 (20.6)	
Primary school	225 (23.7)	114 (23.2)	111 (24.3)	
High school	201 (21.2)	103 (20.9)	98 (21.4)	
Associate or Bachelor degree	188 (19.8)	91 (18.5)	97 (21.5)	
Master or higher degree	101 (10.7)	45 (9.1)	56 (12.2)	
Marital status				0.68
Married	613 (64.6)	330 (67.1)	283 (62.0)	
Non-married	335 (35.4)	162 (32.9)	173 (38.0)	
Long-term illnesses or health problem				**0.002**
Yes	238 (25.1)	144 (29.3)	94 (20.6)	
No	710 (74.9)	348 (70.7)	362 (79.4)	
Self-reported health status				**0.005**
Very bad	65 (6.9)	31 (6.3)	34 (7.4)	
Bad	87 (9.2)	52 (10.6)	35 (7.6)	
Fair	218 (23.0)	127 (25.8)	91 (20.0)	
Good	465 (49.1)	227 (46.1)	238 (52.2)	
Very good	113 (11.9)	55 (11.2)	58 (12.8)	
Perceived income status				**0.003**
Inadequate	505 (53.2)	301 (61.1)	204 (44.7)	
Moderate	341 (35.9)	149 (30.2)	192 (42.1)	
Adequate	102 (10.9)	42 (8.7)	60 (13.1)	

*Missing data not included; Chi-squared significances $P < 0.05$ are printed in bold.
SD, standard deviation.

Table 2
Proportions of different health literacy levels by hospital variables.

Health literacy levels		Private hospital (n = 456)				Public hospital (n = 492)				p value
		Inadequate (n = 112)	Problematic (n = 157)	Sufficient (n = 145)	Excellent (n = 42)	Inadequate (n = 129)	Problematic (n = 188)	Sufficient (n = 135)	Excellent (n = 40)	
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	
General HL		24.6	34.4	31.7	9.3	26.2	38.3	27.4	8.1	**0.002**
Healthcare literacy	Accessing	22.8	33.2	33.3	10.7	27.8	38.7	25.6	7.9	**0.006**
	Understanding	27.2	34.8	28.8	9.2	25.5	36.8	29.1	8.6	
	Appraising	27.3	36.1	28.7	7.9	29.8	38.8	24.2	7.2	
	Applying	23.0	35.9	33.1	8.0	24.3	37.5	30.3	7.9	
Disease prevention literacy	Accessing	26.7	35.8	27.9	9.6	27.3	39.3	25.4	8.0	**0.009**
	Understanding	21.9	33.1	35.1	9.9	23.2	36.7	31.2	8.9	
	Appraising	22.4	33.2	34.3	10.1	24.7	36.2	29.1	10.0	
	Applying	24.0	39.1	30.1	6.8	27.8	38.5	26.8	6.9	
Health promotion literacy	Accessing	21.6	36.4	33.8	8.2	25.5	35.1	29.6	9.8	**0.005**
	Understanding	27.8	36.8	27.9	7.5	28.9	40.4	26.3	4.4	
	Appraising	22.0	32.1	35.6	10.3	24.2	36.8	30.4	8.6	
	Applying	29.1	31.2	29.6	10.1	29.6	35.5	25.5	9.4	
HL index score		**31.7** (95% CI: 31.5–31.8)				**33.2** (95% CI: 33.0–33.5)				

*Missing data not included; Chi-squared significances $P < 0.05$ are printed in bold.
CI, confidence interval.

Table 3
Spearman correlation analysis among potential explanatory factors.

Variables	Min	Max	1	2	3	4	5	6	7	8
1. Gender[a]	1	2	1							
2. Age[b]	1	6	−0.10	1						
3. Education[c]	1	5	0.21[h]	−0.34[h]	1					
4. Marital status[d]	1	2	0.25	0.18	0.19	1				
5. Long-term illnesses[e]	1	2	0.14	0.36[i]	−0.24	0.11	1			
6. Self-reported health[f]	1	5	0.12	0.20[i]	0.31	0.09	−0.58[i]	1		
7. Perceived income	1	3	0.18	0.28[h]	0.21[h]	0.10	−0.15	0.23	1	
8. General health literacy[g]	1	4	0.20[h]	−0.22[i]	0.52[i]	0.13	0.40[i]	0.38[i]	0.35[i]	1

[a] 1 = male and 2 = female.
[b] 1 = 18–24 years and 6 = ≥65 years.
[c] 1 = literate and 5 = master or higher degree.
[d] 1 = married and 2 = non-married.
[e] 1 = yes and 2 = no.
[f] 1 = very bad and 5 = very good.
[g] 1 = very difficult and 4 = very easy.
[h] Correlation is significant at <0.05 level (two tailed).
[i] Correlation is significant at <0.01 level (two tailed).

perceived income group was also found to have lower health literacy level of participants ($r = 0.35$; $P < 0.01$).

In the multivariate logistic regression analyses with the final model (Table 4), those aged between 25 and 34 years compared with those aged ≥65 years from a public hospital were associated with adequate health literacy (odds ratio [OR] = 2.75; 95% CI 1.10–4.90). This was similar for those participants in the same age group from a private hospital (OR = 2.83; 95% CI 1.20–6.60). In overall analysis (model 2), hospital types were associated with having adequate health literacy (OR = 1.26; 95% CI 0.63–2.45). For both hospital types, participants having a master's degree or higher (OR = 3.21; 95% CI 1.81–6.55) in the public hospital and (OR = 4.12; 95% CI 2.40–6.85) private hospital, education level associated with adequate health literacy. Educational attainment, age groups, and perceived income status were positively associated with adequate health literacy in the overall sample. The multivariate model accounted for more than 51% (R-square) of the total variation of adequate health literacy. Its predictive value was higher for a private hospital (50.4%) than for the public hospital (48.2%), indicating that the adequate health literacy level of participants in the private hospital was influenced by these variables (Table 4).

Discussion

This empirical evidence study set out with the aim of examining the differences in health literacy level of participants receiving health services at public and private hospitals in Turkey and determines factors associated with adequate health literacy by hospital type. In 2016, Shanghai declaration on promoting health through sustainable development goals prioritized patient's empowerment by improving health literacy level. With this declaration, health literacy was highlighted as an integral part of the skills and competencies developed over a lifetime.[23] Therefore, this research sheds new light on the differences in health literacy level in patients from two types of hospitals to improve health literacy skills for people with different socio-economic backgrounds. Therefore, the topic of the effects of hospital types on individual health literacy levels or the role of health literate healthcare organization may be the subject of another study.

The consequences of limited health literacy are frequently discussed in the literature on health literacy.[7,24,25] This study is one of them that focused on the comparative health literacy level of patients from between hospital types. The results showed that the

Table 4
Odds ratios (ORs) of having adequate health literacy in the study population by hospital type.

Variables[a]		Public hospital		Private hospital		Overall[b]	
		Model 1[c]	Model 2[d] (final model)	Model 1	Model 2 (final model)	Model 1	Model 2 (final model)
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Gender	Male	1.23 (1.02–1.89)	1.15 (0.65–2.12)*	0.96 (0.50–1.85)	1.10 (0.64–2.11)*	1.40 (1.02–3.16)	1.13 (0.55–2.20)*
	Female	1	1	1	1	1	1
Age groups (years)	18–24	1.88 (0.65–3.46)**	1.80 (0.70–4.20)**	1.72 (0.48–3.60)**	1.82 (0.66–2.71)**	2.10 (1.15–3.60)**	2.15 (1.08–3.75)***
	25–34	2.91 (1.22–5.30)***	2.75 (1.10–4.90)***	2.02 (0.95–4.10)**	2.83 (1.20–6.60)*	3.02 (1.41–6.55)**	2.25 (1.10–4.20)***
	35–44	1.37 (0.44–2.17)	1.66 (0.55–3.15)**	1.55 (0.62–3.85)*	2.02 (0.95–5.10)*	2.70 (1.30–5.82)**	2.10 (0.70–4.05)*
	45–54	1.10 (0.35–2.92)	1.05 (0.40–2.86)	1.03 (0.35–2.75)	1.24 (0.64–2.30)*	1.66 (0.74–3.10)	1.20 (0.55–2.86)*
	55–64	0.76 (0.30–1.18)	0.60 (0.24–1.90)	0.51 (0.26–2.11)	0.48 (0.28–1.85)	0.65 (0.22–2.11)	0.70 (0.26–2.02)
	≥65	1	1	1	1	1	1
Education	MA or higher	3.27 (2.98–5.90)**	3.21 (1.81–6.55)***	3.35 (1.45–7.55)***	4.12 (2.40–6.85)***	4.40 (3.26–7.10)**	4.20 (3.10–6.75)***
	Assc. or BSc.	2.90 (2.33–5.20)**	2.92 (2.01–5.96)*	3.05 (1.80–6.84)**	3.85 (2.06–6.10)***	3.50 (2.10–6.30)***	3.45 (1.84–5.60)**
	High school	1.44 (0.75–2.20)*	1.49 (0.62–3.10)*	2.20 (0.95–5.10)*	2.60 (1.13–4.20)**	2.54 (1.78–3.41)*	2.40 (1.05–4.10)**
	Primary school	0.60 (0.18–1.65)*	0.55 (0.15–2.06)*	1.06 (0.38–3.30)	1.10 (0.45–2.15)	0.95 (0.44–2.11)*	1.04 (0.32–2.23)
	Literate	1	1	1	1	1	1
Long-term illnesses	No	1.20 (0.91–2.32)**	1.25 (0.95–2.56)*	1.31 (0.82–3.10)	1.27 (0.74–2.90)*	1.28 (0.65–1.96)*	1.35 (0.74–3.11)**
	Yes	1	1	1	1	1	1
Self-reported health	Very good		1.85 (0.82–5.60)**		2.23 (0.55–5.20)***		2.25 (0.95–4.18)**
	Good		1.53 (0.70–4.30)*		1.96 (0.92–4.82)*		1.85 (0.82–3.10)**
	Fair		1.10 (0.55–2.80)		1.23 (0.78–3.40)		1.30 (0.54–4.12)*
	Bad		0.76 (0.35–2.15)		0.62 (0.25–1.90)		0.80 (0.44–2.70)
	Very bad		1		1		1
Perceived income status	Adequate	2.11 (1.18–3.55)**	2.05 (1.10–3.40)**	2.22 (0.98–5.05)**	2.08 (0.73–4.04)***	2.13 (1.15–3.63)**	2.10 (1.11–3.60)**
	Moderate	1.55 (0.68–2.80)**	1.46 (0.42–2.57)*	1.60 (0.75–3.83)*	1.57 (0.66–3.81)**	1.61 (0.77–3.80)*	1.59 (0.74–3.88)**
	Inadequate	1	1	1	1	1	1
Hospital types	Private					1.31 (0.71–2.56)**	1.26 (0.63–2.45)**
	Public					1	1
Hosmer–Lemeshow, X^2 (p value)		7.29 (0.43)	5.42 (0.68)	9.30 (0.28)	4.45 (0.82)	6.34 (0.62)	8.72 (0.35)
Nagelkerke R^2		0.432	0.482	0.445	0.504	0.492	0.515

Assc., Associate degree; BSc., Bachelor degree; MA, Master degree
*$P < 0.05$. **$P < 0.01$. ***$P < 0.001$.
[a] Missing data not included.
[b] Included both type of hospitals.
[c] All the model 1 included explanatory factors: gender, age groups, education, marital status, long-term illnesses. All the model 2 (final model) included explanatory factors in model 1 plus self-reported health status.
[d] All of the model 2 (final model) included explanatory factors in model 1 plus self-reported health status.

majority of the study population (61.8%) had limited health literacy. The results of the previous studies in Turkey[10,19,21] were slightly different from the findings of the present study. These differences may partly be explained by two reasons. First, the sample size ranging from 500 to 6500 respondents was used in these studies. The sample size may affect the accuracy of the population estimate. Another reason could be that different sampling methods, improbable and stratification sampling techniques, and survey instruments were used in these studies from the different geographical regions or a place with a small population in Turkey. A study in 2018 also showed that health literacy outcomes varied by geographical locations of respondents.[10]

The health literacy index scores obtained from the present study were not considerably high compared with previous studies in Turkey.[10,19,21] A possible explanation for the differences of sufficient and excellent health literacy scores for respondents from both types of hospitals might be the economic status of individuals. Private hospitals are focusing much more on the quality of health services and profit-making compared with public hospitals. To receive the quality of medical care, the patients with perceived high-income levels are more likely to visit the private hospital than the public hospital. This social gradient in health behaviors is intensely supported by previous studies.[26–28] However, organizational health literacy to better respond and act on the health literacy requirements of population need to be focusing on reducing the demands and complexities of the health care organization. Health care organizations are able to empower the population they serve by providing health literacy–centered interventions and responsive structures and processes.[29] Therefore, further study is required to examine to what extent health organizations enable individuals to find, understand, and use information.

Individuals aged 25–34 years had better adequate health literacy than the other age groups in both hospital types when adjusting for other variables (i.e. age, education, and long-term illnesses). This seems in accordance with findings of former studies.[27,30–32] This finding might be attributable to an age-related decline of the ability to perform cognitive tasks that require information processing. Further research is needed to examine the main reason why the association between 25 and 34 years age group and health literacy.

Increasing education level was found to be associated with better adequate health literacy level for those receiving health services from both hospital types. This finding supports that the 25–34 years age group had better health literacy in the result of the present study because the potential age group of obtaining a master's degree or higher in Turkey is between this age group. Many research studies have shown that the overall level of

education is a predictor of health literacy.[21,25,30,31] It is worth noting that although a low level of education is a risk factor for limited health literacy, higher education level alone is not sufficient for adequate health literacy.[33]

As could be expected, the better the self-reported health, the fewer long-term illnesses were reported in the study. Previous studies confirmed these results.[34,35] Although some studies found that individuals with no chronic illnesses are reported to have higher health literacy scores compared with individuals with at least one chronic illness,[10,36] other studies reported that no statistical relation was found.[37,38] This inconsistency may be because of two reasons. First, it is seen as unnecessary for some individuals with chronic diseases to access or obtain information relevant to health because of the long-term effects of chronic diseases. Second, geographical differences in the region where the study was conducted may play a role in the health literacy level. This means that although some measures for health literacy might be appropriate for some issues, others may require a regional approach.

In the present study, self-reported health status is an important predictor of health literacy for both hospital types. This showed that respondents with better health literacy feel healthier. One striking finding is that self-reported health status seems to affect adequate health literacy levels for both hospital types. This leads to the assumption that this subjective indicator of perceived health status differs, in relation to health literacy, from the objective indicator of education. Comparison of the findings with those of other studies confirmed self-reported health condition was significantly associated with health literacy.[30,32] However, a previous study found that perceived health status was not a predictor variable for health literacy.[26] One important reason could be that the correlations might be spurious because of the presence of different subgroups of health literacy. Furthermore, health literacy and self-rated health may have many determinants in common.[20]

Limitations

This study has several limitations worth highlighting. First, because of the cross-sectional design, conclusions about causality cannot be drawn. Second, the generalizability of the sample is limited both because of the sampling coming from a single region in a city and using the simple random sample methodology. Third, although the health literacy level was assessed using a validated questionnaire in the study, it is comprised not only of reading and quantitative ability but also of interaction between knowledge, societal, and cultural influences that are difficult to measure.[8]

Conclusion

The health literacy level of participants from both types of hospitals was significantly predicted by factors such as gender, age, education, perceived health and income status, and long-term diseases condition. However, respondents from a private hospital had better health literacy than that of the public hospital by health literacy index scores. Furthermore, education seemed to be the salient predictor of health literacy levels in both hospitals. The results of this study should be taken into account by health policy makers and managers to mitigate the differences in health literacy level for patients from both types of hospitals. Continually improved strategies for health literacy should be designed to reduce the barriers to obtaining health-related information. In addition, for healthcare organizations, certain health literacy interventions, such as communication training for health professionals and supports patients to navigate, understand, and use information and services to take care of their health, could be a way to improve health literacy, particularly for patients with limited health literacy.

Author statements

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Ethical approval

Ethical approval was obtained from the Research Ethics Committee of Medical Sciences in both hospitals. This study was conducted in accordance with Helsinki Principles. Informed verbal consent was obtained from participants. It was explained to the participants that participation was completely voluntary and could be withdrawn at any point. On obtaining verbal consent, the participants independently filled in the questionnaire on health literacy without any names or identification items. Data obtained from all participants were kept confidential.

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Competing interests

None declared.

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Short Communication

Vaccine hesitancy among working-age adults with/without disability in the UK

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ABSTRACT

Objectives: To estimate levels of COVID-19 vaccine hesitancy among working-age adults with disabilities in the United Kingdom.
Study design: Cross-sectional survey.
Methods: Secondary analysis of data collected on a nationally representative sample of 10,114 respondents aged 16–64 years.
Results: The adjusted relative risk for hesitancy among respondents with a disability was 0.92 (95% CI 0.67–1.27). There were stronger associations between gender and hesitancy and ethnic status and hesitancy among participants with a disability. The most common reasons cited by people with disabilities who were hesitant were: concern about the future effects of the vaccine, not trusting vaccines and concern about the side effects of vaccination.
Conclusions: The higher rates of vaccine hesitancy among women with disabilities and among people from minority ethnic groups with disabilities are concerning.

Introduction

People with disabilities are at greater risk of infection from SARS-CoV-2, and if infected, of serious illness or death.[1,2] As such, they should be prioritised in vaccination programs. It is important to understand the views of people with disabilities about COVID-19 vaccination. The only information we are aware of suggested no differences in hesitancy between adults (all ages) with/without disability in the United Kingdom (8% vs 9%),[3] although adults with low cognitive ability were more likely to be vaccine hesitant.[4] This study aims to provide evidence on vaccine hesitancy among 'working age' adults with/without disability and the extent to which predictors of hesitancy observed in the general population generalise to people with disability.

Method

Secondary analysis of data collected in Waves 9–11 of *Understanding Society* (US) and Waves *f-h* of online COVID-19 surveys of the US. Full details of the US are available elsewhere.[5–8] The number of full interviews conducted with respondents aged 16–64 (our target age range) at Wave 9 (2017–19) was 27,359 and at Wave 10 (2018–2020) 24,805. Interim data from Wave 11 (2019-) are available for 13,453 individuals aged 16–64.

Following the COVID-19 outbreak, the US undertook eight online surveys on the experiences of participants during the pandemic. Vaccine hesitancy data were collected in Waves *f* (November 2020), *g* (January 2021), and *h* (March 2021). Responses were obtained from 10,435 adults aged 16–64 for whom disability data were available and who participated in at least one wave of COVID surveys (*f-h*); individual response rate approximately 50%.[9]

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Measures

Disability

Disability data were not collected in the COVID surveys. As a result, we coded disability from the most recently available wave of the main survey in which the respondent participated (W11-9).[10] Disability was ascertained by an affirmative response to two questions: (1) '*Do you have any long-standing physical or mental impairment, illness or disability? By "long-standing" I mean anything that has troubled you over a period of at least* 12 months *or that is likely to trouble you over a period of at least* 12 months'; (2) '*Do these health problem(s) or disability(ies) mean that you have substantial difficulties with any of the following areas of your life?*' (disability was coded as present if the participant responded yes to any of the 12 possible response options). Disability data were missing for 1.2% of participants who responded to the COVID surveys.

Vaccine hesitancy

At W*f* of the COVID survey, respondents were asked two questions.

1. '*Imagine that a vaccine against COVID-19 was available for anyone who wanted it. How likely or unlikely would you be to take the vaccine?*' (options; very likely/likely/unlikely/very unlikely recoded into as very likely/likely (not hesitant) vs unlikely/very unlikely (vaccine hesitant)).

2. '*What is the main reason you would not take the vaccine?*'.

At later waves, Q1 was changed to '*When you are offered the coronavirus vaccination, how likely or unlikely would you be to take it?*' and the following question was included.

3. '*Have you had a coronavirus vaccination?*' (options; Y, first vaccination only/Y, both/N, but have an appointment/N). All respondents who reported that they had been vaccinated or had an appointment to be vaccinated were coded as not being vaccine hesitant.

Vaccine hesitancy data were derived from the most recent wave of COVID data collection (e.g., if W*h* was missing, data from W*g* were used, last W*f*). These data were missing for 1.5% of COVID respondents for whom valid disability data were available.

Covariates

We included four covariates in the model, which previous research has shown to be predictive of COVID vaccine hesitancy.[3,11] Age (coded in 10-year age bands) and gender (male/female) were complete for all respondents. Ethnicity data were missing for 6.4% (coded white British/other/unknown). The highest level of educational attainment was missing for 9.4% (coded degree/lower/unknown).

Ethical approval

Approval was granted by the University of Essex Ethics Committee (ETH1920-1271).

Analysis

Complete case analyses were undertaken in Stata 16 using the 'svy' routines and released sampling weights. The analytical sample comprised 10,114 respondents aged 16–64 years for whom valid disability and hesitancy data were available. First, we estimated the prevalence of people with/without disability reporting vaccine hesitancy. Second, we estimated adjusted prevalence rate ratios (APRR), using Poisson regression with robust standard errors for respondents with disabilities (respondents without disabilities being the reference group). We adjusted for between-group differences in age, gender, ethnicity, educational attainment and the wave in which disability status was ascertained. Third, we investigated the potential moderating effects of disability on the association between the four covariates and hesitancy by entering interaction terms into the regression models. Finally, we explored between-group differences in the stated reasons for vaccine hesitancy.

Results

Of the respondents, 21.5% (95% CI 19.9%–23.1%) were identified as having a disability, 8.0% (6.8%–9.3%) were identified as being vaccine hesitant. Of those deemed non-hesitant, 68.1% (66.0%–70.1%) of participants with disability and 50.0% (48.8%–51.1%) of participants without disability were coded as non-hesitant as they had either been vaccinated or had an appointment to be vaccinated.

The estimated prevalence of vaccine hesitancy was 7.1% (5.1%–9.7%) among respondents with disability and 8.2% (6.9%–9.8%) among respondents without disability (APRR for hesitancy among respondents with disability was 0.92 (0.67–1.27)). Testing for potential moderating effects of disability revealed trends toward statistical significance for interaction terms associated with gender (2.01 (0.99–4.10), $P = 0.054$) and ethnicity (1.84 (0.92–3.68), $P = 0.086$). Interaction analyses showed hesitancy was lower for people with disabilities compared to those without for men and White British, higher for ethnic minority groups, and there was no difference for women (Table 1). Examination of the reasons for hesitancy among respondents who were hesitant revealed no statistical evidence of differences between those with/without disabilities. The most common reasons cited by vaccine hesitant people with disabilities were: concern about the future effects of the vaccine (women 44.8% (27.4%–63.4%); men 65.5% (40.7%–

Table 1
APRRs for Interaction Effects with Gender and Ethnicity.

Gender	Men	Women
No disability (reference)	1.00	1.29 (0.95–1.75)
Disability	0.55 (0.30–1.01)	1.43 (0.95–2.15)
Effect of disability within gender groups	0.55 (0.30–1.01)	1.11 (0.76–1.62)
Ethnicity	**White British**	**Other**
No disability (reference)	1.00	2.78*** (1.94–3.99)
Disability	0.74 (0.50–1.09)	3.79*** (2.28–6.30)
Effect of disability within ethnic groups	0.74 (0.50–1.09)	1.36 (0.78–2.39)

Note: ***$P < 0.001$.
APRR, adjusted prevalence rate ratios.

84.1%); not trusting vaccines (women 26.0% (10.3%–51.1%); men 33.2% (11.8%–64.4%)) and concern about the side effects of vaccination (women 26.0% (11.3%–48.6%); men 10.8% (1.2%–36.0%)).

Discussion

Overall levels of vaccine hesitancy are similar between people with and without disability. However, there may be stronger associations between gender and hesitancy and between minority ethnic status and hesitancy among participants with a disability. The relatively higher rates of hesitancy among women and people from minority ethnic groups with disabilities are concerning, indicating a need for public health agencies to address the specific worries of these two groups regarding vaccine safety and to ensure that accommodations are made to the vaccination process to ensure equitable access for women with disabilities and people from minority ethnic groups with disabilities.

The two main limitations of our study are: (1) the relatively low response rate; (2) the use of a cross-sectional design that does not allow for causal inferences to be tested; and (3) the use of online responding that may have reduced response rates among participants with disabilities associated with reduced cognitive capacity.[4] The main strengths are that the US involves a UK representative sampling frame and is one of the few longitudinal studies with pre-COVID-19 data on participants. Taken together with other UK data, in a country with high vaccination rates (at the time of writing), vaccine hesitancy is low among people with disabilities. It will be important to understand hesitancy among disabled populations in countries with different vaccination rates.

Author statements

Ethical approval

Approval was granted by the University of Essex Ethics Committee (ETH1920-1271).

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Competing interests

None declared.

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