JBACHS
Journal of Basic and Clinical Health Sciences

J Basic Clin Health Sci 2023; 7: 713-722
https://doi.org/10.30621/jbachs.1185463
RESEARCH ARTICLE

CHANGES IN MULTIMORBIDITY PREVALENCE IN TURKEY (2008-2019)

Ali Kose[1], Belgin Unal[1]

[1] Institute of Health Sciences, Department of Public Health, Dokuz Eylul University, Izmir, Turkey

ORCID: A.K. 0000-0002-8583-8982; B.U. 0000-0002-4354-8266

Corresponding author: Ali Kose, **E-mail:** a.kose@ogr.deu.edu.tr
Received: 07.10.2022; **Accepted:** 09.02.2023; **Available Online Date:** 31.05.2023

Cite this article as: Kose A, Unal B. Changes in Multimorbidity Prevalence in Turkey (2008-2019). J Basic Clin Health Sci 2023; 7: 713-722.

ABSTRACT

Purpose: To examine the 11-year change in the prevalence of multimorbidity according to age, gender, educational status and NUTS (Nomenclature of Territorial Units for Statistics) regions from 2008 to 2019 in Turkey.
Material and Methods: Data from the Turkiye Health Survey conducted by the Turkish Statistical Institute (TUIK) every 2 or 3 years from 2008 to 2019 were used. Descriptive statistics for multimorbidity were calculated according to gender, age groups, educational status, and IBBS regions. Absolute and relative changes in the prevalence of multimorbidity for 11-year period were examined in the EXCEL program.
Results: In the period between 2008 and 2019, the prevalence of multimorbidity increased by 77.0% in relative terms. The increase in the prevalence of multimorbidity was more evident in the female gender (9.7% to %5.5 in absolute terms), in the group with a low education level (11.4% in absolute, 94.2% in relative terms), in those living in the Eastern Anatolia Region (19.7% absolute, 226.4% relative), and in the aged group 75 years and above (17.8% in absolute terms).
Conclusion: Multimorbidity shows an increasing trend and it is a priority issue for our country.

Keywords: Multimorbidity, trends, change

INTRODUCTION

People with multimorbidity have been increasing globally, due to ageing of communities, demographic and epidemiologic transition, and unhealthy lifestyle (1,2). Multimorbidity is defined as the co-existence of two or more chronic conditions in an individual. Multimorbidity prevalence varies between 12.9% and 95.1% according to age groups (3).

In a study conducted in the Üsküdar region of Turkey, the prevalence of multimorbidity was 27.8% in the population aged 40 and over (4), in a telephone health survey in Germany the prevalence was 39.6% in the population aged 18 years and over (5), and in a representative study in Australia the prevalence as 32.6% (6). Age, socioeconomic deprivation, gender, education level, and unhealthy lifestyle are the most known determinants of multimorbidity (7,8).

As age and socioeconomic deprivation increase prevalence of multimorbidity increases (8). In a large-scale cross-sectional study conducted in Canada, it was found that social deprivation increased the risk of multimorbidity 3.7 times, and in another study conducted in England, there was a strong relationship between age and socioeconomic deprivation with multimorbidity (9,10). Similar to other studies, a study conducted in China showed that multimorbidity rises with age, it is more common in women, those with lower education levels, those without health insurance, and with unhealthy lifestyles (11). Multimorbidity is associated with polypharmacy, more hospitalization, high cost, and low quality of life and functionality closely (12). Multimorbidity increases disability and mortality in the elderly (12). This study aimed to describe trends

in the prevalence of multimorbidity in Turkey from 2008 to 2019.

MATERIAL AND METHODS

The current study was carried out using the data obtained from the Turkiye Health Survey, which was conducted every 2 or 3 years from 2008 to 2019 by TUIK (13,14,15,16,17,18). Turkey Health Survey is a cross-sectional study that examines the health status and health-related behaviors of the adult population over the age of 15. Institutional populations such as army, prisons, and care home residents were excluded. The study sample was selected using a stratified two-stage cluster sampling method. Urban-rural categorization was performed as external stratification criteria. Settlements that have a population between 20.000 and below were categorized as rural, while those having a population between 20.000 and above were categorized as urban. The first stage sampling unit is proportional to the size of randomly selected blocks from clusters (blocks) containing an average of 100 addresses; the second stage sampling unit is the household addresses randomly selected from each selected cluster (13). The number of households and respondents surveyed by the Turkey Health Survey was 14.655 from 6140 households in 2008, 14.447 people from 6551 households in 2010, 28.055 people from 12160 households in 2012, 26.075 people from 8634 households in 2014, 23.606 people from 8325 households in 2016, and 17.084 people from 8166 households in 2019.

Study variables

Dependent variables were the presence of chronic diseases and multimorbidity. In this study, multimorbidity was defined as the presence of two or more of the eight self-reported chronic conditions including hypertension, diabetes, coronary heart disease, asthma, chronic obstructive pulmonary disease, stroke, myocardial infarction, and depression). Presence of chronic diseases in 2008, 2010, 2012 TUIK Health Surveys were based on the responses of individuals on the questions; “Have you experienced the following health problems? Has this health problem been diagnosed by a physician? Have you lived this health problem in the last 12 months?”. In 2014, 2016, and 2019 surveys, the response of the participants to the question “did you experience the following health problems in the last 12 months?” was used to determine the existence of chronic disease.

Independent variables were age, sex, education level, and NUTS (Nomenclature of Territorial Units for Statistics) regions. Age groups were determined as 15-24, 25-34, 35-44, 44-54, 55-64, and 65-70. Participants were separated into three groups based on their education level (low, medium, and high). Those who graduated primary school and/or secondary school and illiterates were grouped as 'low education level', those who graduated high school or occupational high school as “medium education level’, and those achieved associate degree, undergraduate, and/or postgraduate degrees as 'high education level'. The twelve NUTS regions were regrouped into the seven geographical regions of the country for ease of comparison: Marmara, Aegean, Central Anatolia, Mediterranean, East Anatolia, Black Sea, and Southeast Anatolia. However, since the sampling number of the research in 2019 was not sufficient to give an estimate at the level of the Southeastern Anatolia Region, there is no available data for the Southeastern Anatolia Region in 2019.

Statistical Analysis

Descriptive statistics were calculated for multimorbidity according to age, sex, education level, and NUTS regions in every health survey database by using weights provided by TUIK. Subsequently, predicted prevalence of multimorbidity was calculated using simple linear regression equation between given years and prevalence of multimorbidity. The reason for forming the simple linear regression between multimorbidity and years was the presumption of multimorbidity change linearly according to years. When the data were examined, it was thought that the increase and decrease in the frequencies between years might be due to the sampling, the fact that the chronic conditions constituting multimorbidity were defined in different ways in the studies, and the data collection method.

To refine this ambiguity in the data, predicted multimorbidity prevalences were calculated. Absolute and relative changes in terms of multimorbidity in the 11-year period were investigated using the EXCEL program. The prevalence in 2019 was subtracted from the prevalence in 2008 to calculate absolute change.

Table 1. General Characteristics of Participants in Turkiye Health Surveys, 2008-2019

		2008		**2010**		**2012**		**2014**		**2016**		**2019**
	n	%	n	%	n	%	n	%	n	%	n	%
Gender												
Man	6662	45,5	6287	43,5	12925	46,1	8721	45,6	7668	44,5	7784	45,6
Woman	7993	54,5	8160	56,5	15130	53,9	10408	54,4	9574	55,5	9300	54,4
Age Group												
15-24	2878	19,6	2667	18,5	5119	18,2	3388	17,7	2905	16,8	2730	16
25-34	3311	22,6	2902	20,1	5605	20	3661	19,1	3006	17,4	3070	18
35-44	2888	19,7	2819	19,5	5555	19,8	3768	19,7	3444	20	3395	19,9
45-54	2429	16,6	2505	17,3	4921	17,5	3332	17,4	3007	17,4	2918	17,1
55-64	1609	11	1756	12,2	3459	12,3	2555	13,4	2368	13,7	2513	14,7
65-74	946	6,5	1115	7,7	2116	7,5	1498	7,8	1545	9	1589	9,3
75+	594	4,1	683	4,7	1280	4,6	927	4,8	967	5,6	869	5,1
NUTS												
Marmara Region	4746	32,4	5019	34,7	9172	32,7	4879	25,5	4922	28,5	6162	36,1
Aegean Region	472	3,2	367	2,5	735	2,6	1053	5,5	726	4,2	474	2,8
Central Anatolia Region	2564	17,5	2245	15,5	4185	14,9	3589	18,8	2598	15,1	2691	15,8
Mediterranean Region	1577	10,8	1417	9,8	2786	9,9	1612	8,4	1873	10,9	2080	12,2
Black Sea Region	3818	26,1	4144	28,7	8946	31,9	5475	28,6	5561	32,3	4781	28
Eastern Anatolia Region	776	5,3	897	6,2	1537	5,5	1607	8,4	1043	6	896	5,2
Southeastern Anatolia Region	702	4,8	358	2,5	694	2,5	914	4,8	519	3	-	-
Education Level												
Low	10919	74,5	10680	73,9	19747	70,4	13166	68,8	11572	67,1	10771	63
Middle	2457	16,8	2280	15,8	4937	17,6	3362	17,6	3106	18	3246	19
High	1279	8,7	1487	10,3	3371	12	2601	13,6	2564	14,9	3067	18
Total	**14655**	**100**	**14447**	**100**	**28055**	**100**	**19129**	**100**	**17242**	**100**	**17084**	**100**

Table 2. Prevalences of multimorbidity by gender, age groups, NUTS regions and educational status, Turkiye Health Surveys 2008-2019

	2008	2010	2012	2014	2016	2019	Absolute Change	Relative Change	Estimated Absolute Change	Estimated Relative Change
Gender	%	%	%	%	%	%	%	%	%	%
Man	7,2	7,8	7,6	12,2	11,8	12,7	5,5	76,4	6,4	92,8
Woman	12,3	12,3	12,3	21,8	20,8	22	9,7	78,9	12	106,2
Age Groups										
15-24	0,8	0,7	0,5	3,1	2,7	2,6	1,8	225	2,5	516,7
25-34	2,4	2,3	1	4,8	3,5	3,8	1,4	58,3	2,7	105
35-44	6,4	4,9	4,2	9,9	9	9,1	2,7	42,2	4,6	90,2
45-54	13,2	11,3	10,5	23,3	19,9	20,8	7,6	57,6	11	97,3
55-64	21,5	23,1	23,3	32,7	30,7	31,5	10	46,5	11,8	54,6
65-74	33,7	30,9	35,3	43,9	40,4	45,8	12,1	35,9	14,3	45,3
75+	31,2	35,5	35,5	46	47,7	49	17,8	57,1	19,6	62
NUTS										
Marmara Region	12,3	9,3	9,5	18,1	17,8	18,8	6,5	52,9	9,6	98
Aegean Region	8,6	4,5	14,4	16,1	19,1	16,1	7,5	87,2	11,7	153,9
Central Anatolia Region	8,4	10,9	12,5	16,8	14,1	17,5	9,1	108,3	8,7	93,5
Mediterrenian Region	9,6	9,8	9,5	16,1	16,8	14,8	5,2	54,2	7,6	82,6
Black Sea Region	9,1	12,6	8,6	17,7	15	15,9	6,8	74,7	7,2	73,5
Eastern Anatolia Region	8,7	7,8	18,7	17,9	21,9	28,4	19,7	226,4	20,5	268,4
Southeastern Anatolia Region	8,5	8,8	3,2	17,7	27,2	-	18,7	220	18,5	486,8
Education Level										
Low	12,1	12,5	12,7	21,7	21,6	23,5	11,4	94,2	13,5	122,7
Middle	3,3	3,7	4,3	9,1	7,9	8,5	5,2	157,6	6,2	193,75
High	4,7	5	4,2	6,6	5,9	7,2	2,5	53,2	2,6	59,1
Total	**10**	**10,4**	**10,1**	**17,4**	**16,8**	**17,7**	**7,7**	**77**	**9,4**	**101,1**

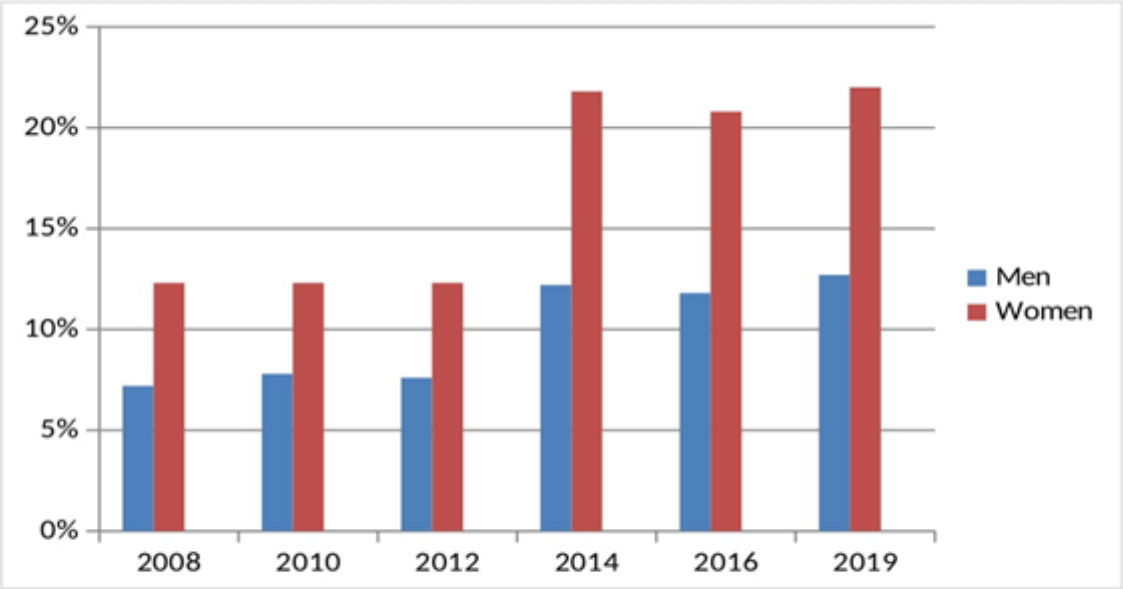

Figure 1. Prevalence of multimorbidity by gender and years

To calculate relative change, the prevalence in 2019 was subtracted from the prevalence in 2008, and the result was divided by the prevalence in 2008 again. To be able to carry out this study permission was taken from TUIK. Dokuz Eylul University, Non-Invasive Research Ethics Committee's approval was obtained with the decision dated 01.03.2021 and numbered 2021/07-33.

RESULTS

Descriptive characteristics of the study population were summarized in Table 1. Over the years, the proportion of women participating in the study ranged from 56.5% to 53.9%. In terms of age distribution, the proportion of participants in the 55-64, 65-74 and over 75 age groups increased between 2008 and 2019. On the other hand, the proportion of 15-24 age group decreased over the years. Considering the distribution of the people in the study group by NUTS regions, it can be said that the participation rates fluctuated over the years. Individuals participating in the study consisted mostly of low education level.

Multimorbidity prevalence was 10% in 2008 and 17.7% in 2019. In total, it was observed that the prevalence of multimorbidity increased by 7.7% in absolute terms and by 77% in relative terms between 2008 and 2019 (Table 2). A more pronounced increase was observed in women compared to men (9.7% and %5.5 in absolute terms respectively) (Figure 1, Table 2). Although there was a rise in multimorbidity in all age groups, the biggest increase (17.8% in absolute terms) was observed in elderly population (≥75). In terms of NUTS Regions the highest increase in the prevalence of multimorbidity was in the Eastern Anatolia Region (19.7% absolute, 226.4% relative), while the lowest increase was found in the Mediterranean Region (5.2% absolute, 54.2% relative) (Figure2, Table 2). In education level groups, the highest increase was in individuals with low education level (11.4% in absolute, 94.2% in relative terms); on the other hand, the lowest increase was in individuals with high education level (2.6% in absolute, 59,1 in relative) (Figure3, Table 2). In addition, absolute and relative changes calculated by using the frequencies estimated by linear regression analysis of the frequency of multimorbidity by years are presented in Table 2. The estimated frequency of multimorbidity increased by 9.4% in absolute terms and by 101.1% in relative terms between 2008 and 2019. Overall, it is evident that the estimated absolute differences in gender, age groups, regions, and educational status groups were higher than the actual differences.

DISCUSSION

In this study, absolute and relative changes in the prevalence of multimorbidity were estimated using the data obtained from Turkey Health Survey conducted by TUIK from 2008 until 2019 in the population aged 15 and over. In the period between 2008-2019, the prevalence of multimorbidity

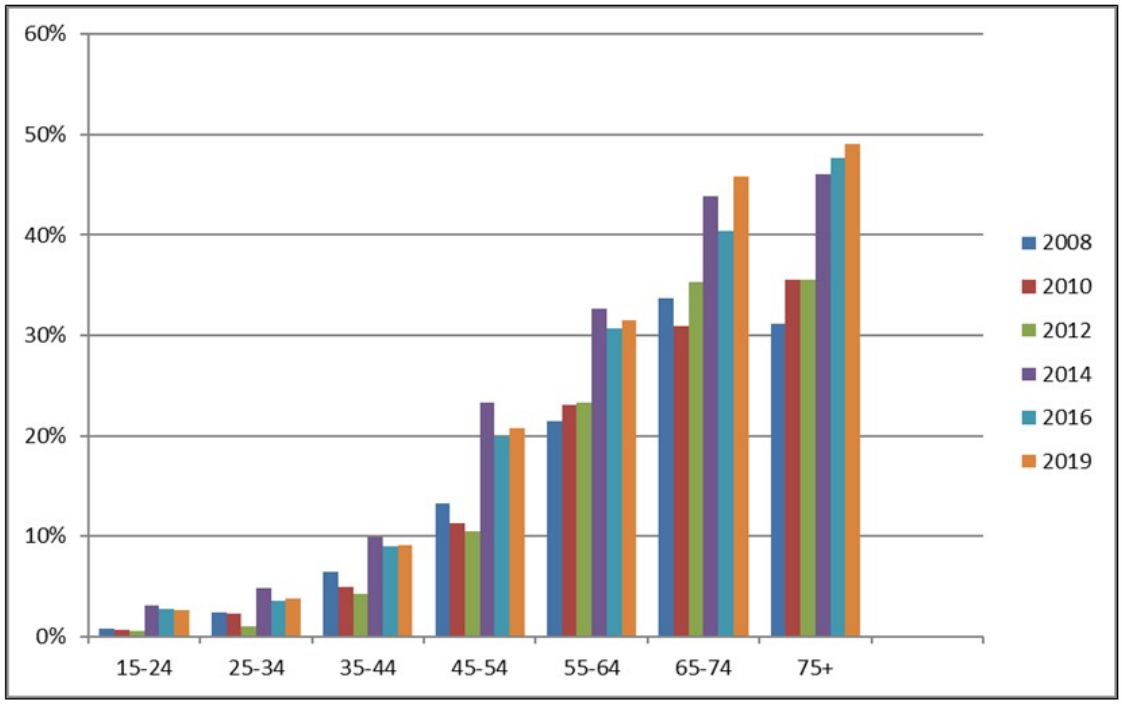

Figure 2. Prevalence of multimorbidity over the years by age groups

increased by 7.7% in absolute terms and by 77.0% in relative terms. According to estimated changes, in total, the prevalence of multimorbidity increased by 9.4% in absolute terms and by 101,1% in relative terms. The increase in the prevalence of multimorbidity was more evident in the female gender, in the group with a low education level, in those living in the Eastern Anatolia Region, and in the age group 75 years and above.

Part of this increase can be explained by an increase in diagnosis of chronic diseases as a result of an increase to access to health services over the years. In year 2002 average number of applying to a doctor was 3.1 and in 2019 this figure reached to 9.8 (18). Additionally, a series of reforms in Turkey within the framework of the Health Transformation Program (HTS) since 2003 has been carried out. One of the aims of HTS was strengthening the health care system, infrastructure, and surveillance system. These improvements in the health system might improved access to health services, outpatient diagnosis and facilitated treatment opportunities (23).

Although there have been many studies on the prevalence of multimorbidity in the literature, there is a limited number of studies on this subject in Turkey (3, 4).

In a study consisting of 15.688 participants in England, multimorbidity was defined as the co-existence of two or more chronic diseases/conditions in an individual. According to the study findings, multimorbidity prevalence was found to have increased over the years: in 2002/2003, the prevalence was 31.7% and as to 2012/2013, the prevalence was 43,1% (19). Similarly, our study also found that the prevalence of multimorbidity increased over time, the prevalence of multimorbidity was 10% in 2008, while it was 17.7% in 2019. The frequency of multimorbidity was found to be higher over time in the previously mentioned study compared to our study, which might have resulted from the fact that the former was conducted based on medical records using UK BIOBANK data, whose participants were aged 50 and over, and 16 chronic diseases/conditions were included in the study (19).

A cross-sectional study conducted in Canada between 1974 and 2014 found that the prevalence of multimorbidity increased from 19.4% to 32.1%, an increase of 12.4% when standardized to the population in 2014, and the prevalence of multimorbidity was higher in women than in men (20). The fact that the prevalence of multimorbidity was found to be higher in women compared to men is in line with the findings of the current study;

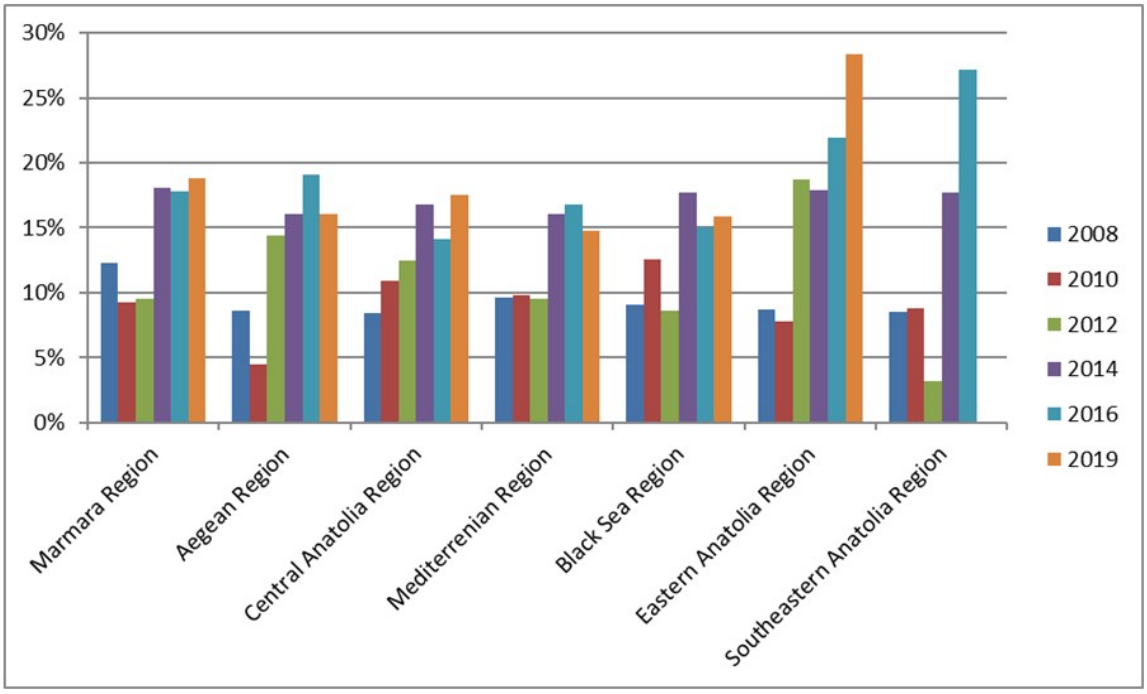

Figure 3. Prevalence of multimorbidity by NUTS and years

however, the fact that the frequency of multimorbidity was higher than that in our study may be due to the inclusion of 12 chronic health problems in the Canadian study.

In a study in the Netherlands, two data sources were used, including medical records of patients listed in a nationally representative network of general practices over the period 2002–2011 and national health interview surveys over the 11-year period. The prevalence of multimorbidity rose from 12.7% to %16.2 in the general practice network and from 14.3% to 17.5% based on the self-reported national health survey data; the estimated prevalence of multimorbidity had increased by 9.3%. Our study has found that the estimated prevalence of multimorbidity in total increased by 9.4% in absolute terms and by 101.1% in relative terms between 2008 and 2019 (21). Although 11 chronic conditions were included in the study mentioned above, the fact that the estimated prevalence of multimorbidity was found to have a similar ratio to the findings of our study may have arisen from the sampling of research and the population included in the study.

An observational study conducted using data from the Nijmegen Continuous Disease Registry, enrolling approximately 13,500 patients, found that increasing age, female gender, and low socioeconomic status are associated with an increase in the prevalence of multimorbidity in the period between 1985 and 2005, including those with four or more chronic diseases by a 300% increase (22). This result is coherent with the findings in our study, which found that the increase in the prevalence of multimorbidity was more evident in the elderly, women, and those with low educational levels.

In the literature, prevalence of multimorbidity increases groups with low socioeconomic status and those living in the deprivation areas (3). However, determinants of multimorbidity were not examined in detail in this study because of lack of data in the Health Surveys databases used in this study. The social determinants of multimorbidity in our country should be comprehensively addressed.

As it is evident from discussions here, multimorbidity was defined as the co-existence of two or more chronic conditions in our study as was done in other studies. On the other hand, differences in the number of diseases in the study and differences in the demographic characteristics of the research population complicate the comparison of results. For this reason, standardization is essential for the assessment and definition of multimorbidity. In other words, the number of chronic conditions to be included in the study and the general characteristics of the population to be studied should be clearly

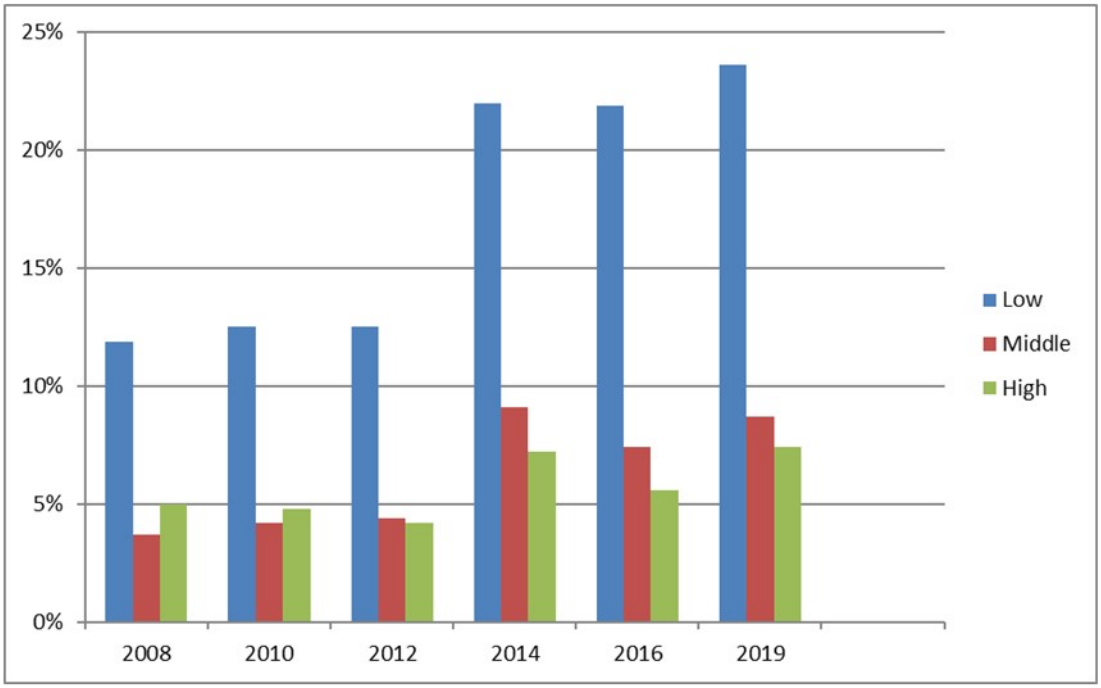

Figure 4. Prevalence of multimorbidity by years and education level

defined, and a precise definition of multimorbidity should be provided.

Understanding the epidemiology of these diseases is of great importance in terms of public health measures to be taken as individuals with chronic diseases and those with multimorbidity have poorer health outcomes aside from a higher risk of death compared to those without multimorbidity or chronic diseases. Likewise, it is of vital importance to organize health services in line with the needs of individuals with these diseases (3,4,8).

Strengths and Limitations of the Study

The key strength of this study is the use of large-scale nationally representative samples of the Turkey population by the statistical institution that produces statistics on chronic diseases, lifestyle, and sociodemographic characteristics and that it presents comparable data in terms of multimorbidity epidemiology.

The fact that the data is based on personal statements may have caused these diseases to be over-or underreported. However, since the data collection method is the same in all TUIK Health Surveys, the difference observed between the years cannot be explained simply by the difference in the statements of the individuals. Changes in the survey questions or the way how questions were used over the years may affect the prevalence. For example, while the frequencies in 2008, 2010 and 2012 were close to each other, it is noteworthy that there had been a marked increase in the frequency of some diseases and multimorbidity as of 2014; similarly, the frequencies in 2016 and 2019 were found close to each other. This finding suggests of a change in method rather than an actual increase in diseases. Having examined the trends in diseases one-by-one, the prevalence of depression has increased more than twice in 2014. The number of people included in the study and the distribution of people between age groups may have affected the frequency of both diseases and multimorbidity. The rate of patients aged 65 and over in the study group has increased since 2014 compared to previous years.

CONCLUSION

This study is the first study in our country using the national survey data and examining the change in the frequency of multimorbidity over time. The findings show that the prevalence of multimorbidity increased remarkably in 11 years. The increase in the prevalence of multimorbidity is more pronounced in the female gender, in the 75 and above age group, those with a low education level, and those living in the Eastern Anatolia Region. Decision-makers need to take these trends into account to improve public

health. Future disease prevention and control programs should consider multimorbidity.

Acknowledgement: I would like to express my endless thanks to TUIK for sharing the TUIK Health Survey data.
Author contributions: AK: Conception, design, literature review and interpretation, data collection, data processing, writing, critical review. BU: Literature review and interpretation, data collection, data processing, writing.
Conflict of interests: There is no conflict interest in this study.
Ethical approval: Dokuz Eylul University, Non-Invasive Research Ethics Committee approval was obtained with the decision dated 01.03.2021 and numbered 2021/07-33.
Funding: No financial assistance was received in the conduct of this study.
Peer-review: Externally peer-reviewed.

REFERENCES

1. World Health Organization [Internet]. Noncommunicable diseases. [Accessed date: 30 June 2021]. Available from: https://www.who.int/news-room/factsheets/detail/noncommunicable-diseases
2. T.R. Ministry of Health. Turkey Cardiovascular Diseases Prevention and Control Program 2010-2014. Ankara: General Directorate of Primary Health Care: 2015. Report number: 988.
3. Sakarya S. Kronik hastalıklar bağlamında birinci basamakta multimorbiditenin epidemiyolojisi. Türkiye Klinikleri 2019; 6-11.
4. Karahan O. The Prevalence of Multimorbidity in the Population aged 40 and over registered to the Primary Care in Usküdar Region (thesis). Istanbul: Marmara Univ. 2015.
5. Puth MT, Weckbecker K, Schmid M, Münster E. Prevalence of multimorbidity in Germany: impact of age and educational level in a cross-sectional study on 19,294 adults. BMC Public Health 2017;17(1):1-7.
6. Harrison C, Henderson J, Miller G, Britt H. The prevalence of complex multimorbidity in Australia. Australian and New Zealand journal of public health 2016;40(3):239-44.
7. Violan C, Foguet-Boreu Q, Flores-Mateo G, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. PloS one 2014;9(7):10-21.
8. Academy of medical sciences (Royaume uni). Multimorbidity: a priority for global health research. Academy of medical sciences, 2018.
9. Roberts KC, Rao DP, Bennett TL, Loukine L, Jayaraman GC. Prevalence and patterns of chronic disease multimorbidity and associated determinants in Canada. Health Promot Chronic Dis Prev Can 2015;35(6):87-94.
10. Li J, Green M, Kearns B, et al. Patterns of multimorbidity and their association with health outcomes within Yorkshire, England: baseline results from the Yorkshire Health Study. BMC Public Health 2016;16(1):1-9.
11. Wang HH, Wang JJ, Wong SY, et al. Epidemiology of multimorbidity in China and implications for the healthcare system: cross-sectional survey among 162,464 community household residents in southern China. BMC Med 2014;188(12):1-12.
12. Kose A. Change in the frequency of chronic diseases and multimorbidity in Turkey (thesis). Izmir: Dokuz Eylul Univ. 2021.
13. TURKSTAT. Turkish Statistical Institute Health Survey 2008 [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
14. TURKSTAT. Turkish Statistical Institute Health Survey 2010. [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
15. TURKSTAT. Turkish Statistical Institute Health Survey 2012. [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
16. TURKSTAT. Turkish Statistical Institute Health Survey 2014. [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
17. TURKSTAT. Turkish Statistical Institute Health Survey 2016. [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
18. TURKSTAT. Turkish Statistical Institute Health Survey 2019. [Internet]. [Accessed on 20 July 2021]. Access address: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101
19. Dhalwani NN, O'Donovan G, Zaccardi F, et al. Long terms trends of multimorbidity and association with physical activity in older English

population. Int J Behav Nutr Phys Act 2016; 13(8): 1-9.
20. Chireh B, D'Arcy C. Contrasting trends in prevalence of chronic diseases and multimorbidity, Canada 1978–2014. SN Comprehensive Clinical Medicine 2020; 2(9): 1563-72.
21. Van Oostrom SH, Gijsen R, Stirbu I, et al. Time Trends in Prevalence of Chronic Diseases and Multimorbidity Not Only due to Aging: Data from General Practices and Health Surveys. PLoS One 2016;11(8):1-14.
22. Uijen A, Lisdonk E. Multimorbidity in primary care: Prevalence and trend over the last 20 years. European Journal of General Practice 2009; 14(1):28-32.
23. Erol H, Özdemir A. Türkiye'de Sağlık Reformları ve Sağlık Harcamalarının. SGD-Sosyal Güvenlik Dergisi 2014;4(1):9-34.
24. SD Platform. Demographic and Epidemiological Transitions. [Internet]. [Access Date: January 16, 2023]. Access: https://www.sdplatform.com/Yazilar/KoseYazilari/417/Demografi-ve-EpidemiolojiGecisler.aspx