International Journal of Community Medicine and Public Health
Himanshu et al. Int J Community Med Public Health. 2022 Aug;9(8):3197-3208
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20222024

Original Research Article

Association between multimorbidity and quality of life among older adults in community-dwelling of Uttar Pradesh, India

Himanshu*, P. Arokiasamy, Y. Selvamani

Department of Development Studies, International Institute for Population Sciences, Mumbai, Maharashtra, India

Received: 12 June 2022
Accepted: 07 July 2022

***Correspondence:**
Dr. Himanshu,
E-mail: himanshudcsk@gmail.com

ABSTRACT

Background: Increasing longevity with the coexistence of chronic multimorbidity makes the elderly population vulnerable to functional limitation, disability and more frequent hospitalization, resulting deterioration in the quality of life (QoL). The present study examines the association between chronic multimorbidity and QoL among the older population in Varanasi, India.
Methods: A cross-sectional data of 500 individuals in the Varanasi district of Uttar Pradesh, India aged 50+ years were collected using a multistage simple random sampling procedure from November 2017 to May 2018. Multimorbidity variable was generated using eight self-reported chronic conditions. WHOQOL-BREF was utilised to assess the QoL of the study participants. Descriptive analysis was performed to assess the mean QoL score pattern, whereas multivariate linear regression analysis examines the association between multimorbidity and QoL.
Results: The mean age of respondents was 64 [±10.7] years, and 49% were female. Eighteen percent of study participants had multimorbidity (2+). The mean QoL score was 70, which decreased with age and was found higher among males (73). Multivariable regression analysis shows that demographic and lifestyle risk factors are significantly associated with QoL. Elderly with multimorbidity (β=-4.42; 95% CI=-7.18: -1.66) and physical inactivity (β=-4.65; 95% CI=-6.9: -2.3) was significantly associated with reduced QoL.
Conclusions: Multimorbidity along with demographic and lifestyle factors are significantly associated with QoL. Healthcare programmes need to focus multimorbidity while promoting healthy and risk-free lifestyle to control modifiable risk factors. For their day-to-day needs, government assistance is necessary for the most economically dependent older population.

Keywords: Quality of life, Older adults, Chronic diseases, Multimorbidity, Uttar Pradesh, WHOQoL-BREF

INTRODUCTION

The rising share of the older population is one of the significant demographic transformations of the twenty-first century, reflecting the progress in human development. The changing longevity and age-sex structures resulted in a higher dependency ratio and a rising prevalence of chronic diseases.[1,2] On World Health Day in 2012, WHO declared," Good health adds life to years", emphasizing the relevance of QoL in later life. The most significant public health challenge of increasing longevity is improving the quality of life (QoL) in later years. In other words, add life to years.

One of the key challenges with ageing is the rising prevalence of chronic non-communicable diseases.[2] Chronic diseases are strongly associated with hospitalization, higher healthcare costs, and functional limitations and poor mental health.[3-5] The growing burden of multimorbidity in the particular context of NCD poses

several challenges at individual, community, and health system levels.[6] However, the implications are profound at the individual level, including impaired physical and social functioning and poor QoL.[3,7] The coexistence of multimorbidity makes the elderly prey to functional limitation, disability, and frequent hospitalization, resulting in QoL deterioration. This association between QoL and age is well established in many studies, where QoL tends to decline as the individual grows old.[8] Studies show that family structure has changed due to modernization and urbanization, resulting in more psychological problems for the elderly. The combined effect of ageing, disease and social changes is likely to impact the health and wellbeing of the elderly negatively.[9] Concurrent empirical studies suggest the impact of socioeconomic status on the physical environment and, subsequently, health outcomes.[5]

A growing body of literature has investigated the QoL of the elderly in developed countries as the QoL is a subjective phenomenon and cannot be directly measured. Research on QoL remains neglected in developing countries and low resource settings. Very few studies have been conducted within India to understand the association between multimorbidity and QoL in the geriatric population.[1,10-12] However, very few studies have examined the association between multimorbidity and quality of life in the state of Uttar Pradesh. These gaps suggest the need to study QoL and its cofounding factors among the older adult population for effective intervention measures to enhance QoL at the community level. From this background, the objective of the present research is to study the association between NCD multimorbidity and the QoL in the Varanasi district of Uttar Pradesh

METHODS

Sampling design

For the present study primary data was collected in Varanasi district of Uttar Pradesh state, from December 2017 to May 2018. The data used in the study is cross-sectional, and a multistage simple random sampling procedure was adopted. In the first stage, three blocks were selected out of eight blocks. Three primary sampling units were randomly selected at the second stage from each block, keeping urban and rural compositions in view. Further, the third stage adopted a proportional allocation procedure to obtain the desired number of households from every primary sampling unit (PSU). We prepared a list of households with at least one respondent age 50 and above through house listing. Using a systematic simple random sampling method, we selected the targeted number of households, and from every selected household, one older adult age 50 and above was selected for the survey. Respondents with severe cognitive impairment or physical impairment were excluded from the study.

Study area

For the current study, the Varanasi district of Uttar Pradesh state was selected, with demographic and socioeconomic indicators similar to the state. Varanasi is located in the south-eastern part of Uttar Pradesh, with a population of 3.6 million. The older adult population aged 50 years and above constituted 14.6% which is relatively higher than the state (13.9%) in the 2011 census.[13] Varanasi district has 1.84% of the total population of Uttar Pradesh, with a considerable proportion of the urban population (43%), which is again higher than the state average of 22%.

Sample size determination

In the absence of morbidity prevalence data for the study area, we took the estimated morbidity prevalence rate of Uttar Pradesh from the WHO-SAGE survey as a proxy for the Varanasi district. The state-level prevalence of multimorbidity was 16.8% for the older population age 50 and above. Allowing 20% non-response rate, 95% confidence level, 5% margin of error with and 1.75% design effect, the estimated sample size was 451. The final sample size of the study was 500.

Ethical considerations

The study was approved by the Student Research Ethics Committee (SREC) of the International Institute for Population Sciences (IIPS), Mumbai (Sr.No. 15/1843, Date:13/10/2017). All respondents provided informed consent and were informed that they could withdraw from the study at any stage.

Outcome variable

Quality of life

In the present study, the outcome variable is the QoL (overall wellbeing). The WHOQOL-BREF questionnaire has shown to be a good, reliable and valid cross-cultural measure for assessing QoL. The WHO-BREF consists of four significant domains, namely- physical, psychological, social relation and environment. The four domain consists of 24 questions. Two additional questions were asked related to overall health and QoL. For the present analysis, we used two sets of QoL measures. The first set, including domain-specific QoL, is based on 24 questions, and a second index is based on 26 items. The WHOQOL-BREF is a combination of both positive and negative items. The positive items include happiness, content, and energy, whereas the negative items include sadness, sexual difficulty, and pain. The scoring method of domain-specific QoL is presented in the supplementary table at the end of the paper. However, the detailed methodology of WHOQOL-BREF is given elsewhere.[14] The second set outcome variable, which was the overall quality of life, was created from all 26-items.

Using the additive method, a raw score was generated, and this raw QoL score rescales on 0-100, where higher values present a higher QoL score.

Main Predictor variable

Multimorbidity

This study included eight self-reported chronic conditions, including arthritis, diabetes, hypertension, asthma, stroke, chronic obstructive pulmonary disease (COPD), angina and cancer. Further, we generated a single variable by combining these chronic diseases and coded them as no disease, one disease & two or more diseases.

Covariates

Three sets of independent variables were used to assess their effects on QoL, namely demographic, health, socioeconomic factors and lifestyle factors. Demographic and health factors included are: a) Self-rated health (good SRH and poor SRH), b) Age (50-59, 60-69, and 70+), c) Sex (male and female), and d) marital status (currently married and widowed). The socioeconomic factors included are: a) years of schooling (illiterate, 1-5 years, 6-9 years and 10 and above), b) religion (Hindu and Muslim), c) caste (Scheduled Caste (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), and others), d) residence (rural and urban), e) wealth index (poor, middle, and rich), and f) economic independence (totally dependent, partially dependent and independent).

The lifestyle factors included are: physical activity based on the WHO recommendation of physical activity, which included either 75 minutes of vigorous activity or 150 minutes of moderate physical activity in a week as sufficient physical activity and those who failed kept as doing insufficient physical activity.[15] Sedentary behaviour is defined as those having more than 4 hours of a day sitting in leisure time activity (yes and no).

Data analysis

Descriptive statistics, mean proportions with standard deviations and Cronbach alpha were used to present the sample characteristics of the study population. Inferential statistics like t-tests and variance analysis (ANOVA) were used to test differences in the mean QoL score of multimorbidity and sociodemographic health measures.

Multivariate linear regression analysis was performed to study the association of chronic multimorbidity and sociodemographic measures with QoL among older adults. All the results were presented with the beta coefficient. A p value<0.05 was considered as the level of significance. All analysis was performed with STATA 14.2 software.

RESULTS

Sample distribution of the study population by socioeconomic profile

Table 1 shows the study participant's socioeconomic and demographic characteristics. The prevalence of multimorbidity in the study population was 18.4%. The median age of the study population was 62, one-fifth of the study participants belonged to the 70-plus age group, and the sample was about equally distributed among men and women. Most of the study participants were currently married (66%), and 18% reported poor self-rated health. The majority of participants belonged to the Hindu religion (81%). Half of the study population were illiterate and belonged to the OBC (Other Backward Castes) category. About one-third of the study participants were economically independent, 43% were physically inactive, and 32% reported engaging in sedentary behaviors.

Domain-wise quality of life among older adults

Table 2 presents the mean WHOQOL-BREF domain scores of the study population. The mean physical health score was the highest for the psychological health domain (59.1), followed by the physical health domain (56.9) and the environment domain (54.5), with the lowest mean domain score for social relationship (40.6). The Cronbach alpha value of 0.84 among the environment domain showed that the variables were mostly consistent with each other. The lowest Cronbach alpha value was found for the social relationship (α=0.42) domain. The physical domain's alpha value was 0.77 and 0.82 for the psychological domain, which showed that the variables were consistent.

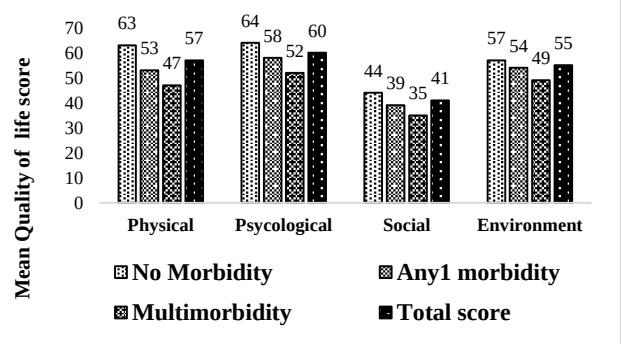


Figure 1: Domain wise mean quality of life score by the number of chronic morbidities among older adults, Varanasi, Uttar Pradesh (n=500).

Figure 1 portrays the association of quality-of-life domain score with chronic morbidity among older adults. The results show that the increasing disease count was inversely associated with the quality-of-life score. The mean quality of life score ranged from 60 in the psychological domain to 41 in the environment domain.

For instance, in the physical domain, the quality-of-life score declined from 63 for those having no disease to 47 for those with multimorbidity. Similarly, respondents with no morbidity had 64 quality of life scores in the psychological domain, which declined to 52 among respondents with multimorbidity. Respondents with no morbidity reported 44 quality of life scores in the social domain, whereas the score is 35 for respondents with multimorbidity.

Further, in the environment domain, the respondent's mean quality of life score was 57, which declined to 49 for those with multimorbidity.

Table 1: Sample distribution of the older people by their background characteristics, Varanasi, Uttar Pradesh (n=500).

Background characteristics	N	Percentage
Age (years)		
50-59	191	38.2
60-69	177	35.4
≥70	132	26.4
Min=50; Max=105; Mean=63.9; SD=10.7; Median=62		
Sex		
Male	257	51.4
Female	243	48.6
Marital status		
Currently married	332	66.4
Others	168	33.6
Self-rated health		
Good	409	81.8
Poor	91	18.2
Number of diseases		
No disease	257	51.4
Anyone disease	151	30.2
Multimorbidity	92	18.4
Years of schooling		
Illiterate	225	45
1-5 years	111	22.2
6-9 years	86	17.2
10+ years	78	15.6
Religion		
Hindu	407	81.4
Muslim	93	18.6
Caste		
SC/ST	99	19.8
OBC	271	54.2
Others	130	26
Place of residence		
Rural	227	45.4
Urban	273	54.6
Wealth Index		
Poor	167	33.4
Middle	167	33.4
Rich	166	33.2
Economic dependency		
Totally dependent	203	40.6
Partially dependent	145	29
Independent	152	30.4
Physical activity status		
Sufficient	283	56.6
Insufficient	217	43.4

Continued.

Background characteristics	N	Percentage
Sedentary behaviors		
Yes	158	31.6
No	342	68.4
Total	**500**	**100**

Table 2: WHOQOL-BREF (domain wise) score among older adults of Varanasi, Uttar Pradesh (n=500).

WHOQOL-BREF Domain	Item amount	Min	Max	Mean	SD	Cronbach alpha- α	QoL score (median)	
							N	%
Physical health	7	17.9	100	56.9	16.4	0.77	230	46.0
Psychological health	6	8.3	100	59.9	18.2	0.82	210	42.0
Social relationship	3	8.3	100	40.6	19.8	0.42	132	26.4
Environment	8	9.4	100	54.5	17.3	0.84	243	48.6

Table 3: Mean QoL score (26 items) by chronic diseases and selected background characteristics in Varanasi District of Uttar Pradesh (n=500).

Demographic and health factors	Overall mean QoL [±SD]	N
Number of chronic diseases	F=24.31; p value <0.001	
No disease	73.7 [±13.0]	257
Anyone disease	68.1 [±12.7]	151
≥2 diseases	63.5 [±12.0]	92
Age (years)	F=29.19; p value <0.001	
50-59	75.0 [±12.3]	191
60-69	69.3 [±12.6]	177
≥70	64.2 [±13.2]	132
Sex	t=5.77; p value <0.001	
Male	73.4 [±12.9]	257
Female	66.7 [±12.9]	243
Marital status	t=7.30; p value <0.001	
Currently married	73.1 [±13.7]	332
Otherwise	64.3 [±10.3]	168
Self-Rated Health	t=7.11; p value <0.001	
Good	72.0 [±13.1]	409
Poor	61.6 [±10.8]	91
Socioeconomic factors		
Year of schooling	F=13.71; p value <0.001	
Illiterate	67.7 [±13.0]	225
1-5 years	67.8 [±13.5]	111
6-9 years	73.2 [±13.1]	86
≥ 10 years	77.3 [±10.9]	78
Religion	t=2.32; p value <0.05	
Hindu	70.8 [±12.9]	407
Muslim	67.3 [±14.7]	93
Caste	F=3.13; p value <0.05	
Scheduled caste/tribe	67.6 [±11.8]	99
Other backward class	70.1 [±13.8]	271
Other than above	72.0 [±13.1]	130
Residence	t=-0.612; p value = 0.541	
Rural	69.7 [±12.6]	227
Urban	70.5 [±14]	273
Wealth index	F=15.77; p value < 0.001	
Poor	67.0 [±13.6]	167
Middle	68.8 [±13.1]	167

Continued.

Demographic and health factors	Overall mean QoL [±SD]	N
Rich	74.6 [±12.1]	166
Economic independence	F=37.10; p value <0.001	
Totally dependent	65.5 [±12.0]	203
Partially dependent	69.5 [±13.2]	145
Independent	77.0 [±12.3]	152
Lifestyle and risk factors		
Physical activity	t=-11.34; p value <0.001	
Sufficient	75.4 [±11.6]	283
Insufficient	63.2 [±12.2]	217
Sedentary behaviors	t=8.95; p value <0.001	
Yes	62.8 [±10.6]	158
No	73.5 [±13.1]	342
Total	**70.13 [±13.3]**	**500**

Table 4: Linear regression analysis of multimorbidity, health, socioeconomic and lifestyle determinants of QoL among the older adults in Varanasi, Uttar Pradesh (n=500).

Background characteristics	β-Coeff [95% CI]
Multimorbidity	
No disease	Ref
Anyone disease	-1.84[-4.08: 0.4]
≥2 diseases	-4.42**[-7.18: -1.66]
Self-rated health (SRH)	
Good SRH	Ref
Poor SRH	-4.29**[-6.95: -1.64]
Age (years)	
50-59	Ref
60-69	-3.75**[-6.09: -1.42]
≥70	-4.25**[-7.2: -1.29]
Sex	
Male	Ref
Female	-1.97[-4.38: 0.44]
Marital status	
Currently married	Ref
Otherwise	-3.36**[-5.59: -1.13]
Year of schooling	
Illiterate	Ref
1-5 years	-2.82*[-5.34: -0.3]
6-9 years	-1.75[-4.65: 1.15]
≥10 years	-0.81[-4.12: 2.51]
Religion	
Hindu	Ref
Muslim	-2.45[-5.11: 0.21]
Caste	
Scheduled caste/tribe	Ref
Other backward class	2.83*[0.22: 5.44]
Other than above	2.76[-0.17: 5.7]
Residence	
Rural	Ref
Urban	-0.15[-2.2: 1.89]
Wealth index	
Poor	Ref
Middle	1.87[-0.48: 4.22]
Rich	5.41***[2.86: 7.95]
Economic independence	

Continued.

Background characteristics	β-Coeff [95% CI]
Totally dependent	Ref
Partially dependent	1.7[-0.73: 4.12]
Independent	4.41**[1.37: 7.45]
Physical activity	
Sufficient	Ref
Insufficient	-5.43***[-7.8: -3.06]
Sedentary behavior	
Yes	Ref
No	1.76[-0.73: 4.25]
Adjusted R2	**0.36**

Note: ®= Reference; *** p<0.001, ** p<0.01, * p<0.05.

Differences in overall quality of life score among older adults by their background characteristics

Table 3 shows the mean QoL score by background characteristics. The overall mean QoL score declined with the number of chronic diseases. Those who did not report any chronic conditions had a mean score of 73.7, which declined to 63.5 among those who had two or more chronic conditions. The mean QoL score also declined with age and was found highest among older adults in 50-59 age groups, followed by those aged 60-69 and lowest among those aged 70 and above. The gender difference was significant in the mean QoL score, where females (64.2) reported lower scores than males (73.4). Married respondents had a higher QoL score (73.1) than others (64.3). Those who reported good self-rated health had10-point higher scores than those who reported poor SRH (61.6).

The QoL mean score was positively associated with education, with lower mean score among illiterate (67.7) and higher mean score among those with 10 or more years of schooling (77.3). Hindu respondents showed a higher QoL score (70.4) than Muslims (67.3). Respondents of Scheduled caste or tribe had lower mean QoL scores, while those of Other backward castes (OBC) and other castes had higher QoL scores.

The mean QoL was 67.0 among respondents in the poorest wealth index, which increased to 74.6 among those belonging to the richest wealth index category. Similarly, the mean score increased with economic independence. For respondents who reported being independent, the mean score was 77.0, whereas fully dependent respondents had (65.5) around ten points lower. For those partially dependent, the mean score was 69.5.

As far as lifestyle factors are considered, physical activity contributed to a higher mean score. Those who reported insufficient physical activity had a lower QoL score (63.2), and among those who reported some physical activity, the mean score was 75.4. The mean score of respondents who did not report any sedentary behaviour had a higher QoL than those who had reported sedentary behavior.

Multivariate regression analysis of socioeconomic and demographic predictors of QoL among older adults

Results of multivariate regression analysis on the association of sociodemographic, health, and risk factors with QoL are presented in Table 4. All results are presented with a .05 level of significance. Both age and multimorbidity were inversely associated with quality of life. Quality of life was significantly and negatively associated with the widowed (β=-3.43; CI=-5.6: -1.3) respondents. Older adults who reported poor SRH (β =-3.26; CI=-5.9: -0.7) had significantly lower quality of life. Respondents with up to 5 years of schooling have three-point higher QoL compared to illiterate. Respondents with insufficient physical activity (β=-4.65; CI=-6.9: -2.3) had lower QoL than those with sufficient physical activity.

Other backward castes (OBC) respondents (β=2.84; CI=0.30: 5.38) and the general caste (β=3.01; CI=0.15: 5.87) respondents had significantly better quality of life compared to scheduled caste or tribe respondents. The respondents in the rich wealth index (β=4.54; CI=2.0: 7.0) had significantly higher quality of life than those in the poorest wealth index. Economically independent respondents (β=3.71; CI=0.7: 6.7) had significantly higher quality of life scores than the economically dependent respondents.

DISCUSSION

There is a lack of research on how the quality of life is influenced by the presence of multimorbidity at the community level in India, where very few have reported the effect of disease severity and pattern.[16] Notably, very little is known about the association between multimorbidity and the quality of life of the older population in Uttar Pradesh, a more populous state in India. In this study, we used WHO-BREF to measure QoL to examine the association with multimorbidity among the study population.

The overall mean QoL of 70.1±13.3 is 10 points higher than the QoL score reported in a previous study conducted in the Varanasi district's rural area.[17] However, a study conducted in Bangladesh reported a similar level

of QoL among the elderly.[18] The inclusion of older adults aged 50+ instead of the elderly population aged 60-plus may be part of the higher overall mean QoL.

In our study, multimorbidity has adversely affected the quality of life among older adults aged 50 years and more after controlling for important confounding variables, suggesting the role of multimorbidity in determining the quality of life in old age. This finding is consistent with other studies conducted in India and other countries where chronic diseases were found significantly associated with lower quality of life.[17,19-21]

The presence of chronic diseases, especially multimorbidity, has a significant impact on the individual outcomes, such as the higher likelihood of hospitalization, higher expenditure associated with economic deterioration and functional limitation, which will further affect the quality of life of the older population. Globally, several studies have observed the association of chronic diseases with out-of-pocket expenditure, poor general health, and care dependence. Chronic multimorbidity (the presence of two or more chronic medical conditions) is particularly associated with higher hospitalization,[28] out-of-pocket expenditure, and other economic consequences that affect the individual's quality of life. Further, the association between multimorbidity and functional limitation is strongly evident with deteriorating quality of life. A study conducted in India using WHO-SAGE nationally representative data suggests a higher likelihood of functional limitations and depression among older adults with multimorbidity.[5]

It is also notable that chronic disease is associated with age discrimination.[23] As a result, multimorbidity-associated abuse and discrimination can affect the quality of life of the older population. It is also notable that multimorbidity is closely associated with higher care dependence.[24,25] As a result, the elderly with multimorbidity are more likely to experience a lower quality of life. All these factors associated with multimorbidity can affect the quality of life of the older population.

The mean QoL score was higher among males and currently married, consistent with previous findings.[17,26-28] These gender differences can be traced to the Indian cultural context where women had limited access to finance with their engagement in household work, limiting their bond with other people than men. It also shows the importance of family and neighbourhood circumstances in determining the quality of life in old age. Also, Barua et al. (2005) showed that married elderly had better QoL scores than those not currently married.[20] Living with a partner or spouse is important in protecting QoL old age. Age was found negatively associated with QoL, consistent with the studies.[17,29,30] However, other studies conducted in higher-income countries showed an insignificant association between age and QoL.[31]

The highest mean QoL score was observed for the psychological domain (56.9) and the lowest for the social domain. However, other studies showed that the social relationship domain score was higher than other QoL domain scores.[17,19,20,28] A study conducted in Kerala reported a similar mean social domain score.[12]

In this study, education attainment significantly correlates with quality-of-life scores consistent with previous literature.[17,30,32] The study results showed that those in the higher wealth quintile reported better QoL than those in lower wealth quintiles.[17] Our finding showed that respondents reporting financially independence had a much higher mean QoL score than those who financially depended on others for their day-to-day needs. Studies based on the NSSO 60th round showed similar results where economic independence was significantly associated with perceived good health.[33,34] This may be due to economically independent people engaged with their occupation being less bothered about their minor health problems.

The role of physical activity was profound in determining the QoL. Consistent with the previous systematic review reported by Vagetti et al, physical activity was positively and consistently associated with QoL.[35] This can also be understood with the norm that promoting physical activity will impact physical health. WHO recommended that older adults have at least 150 minutes of moderate or 75 minutes of vigorous physical activity for healthy ageing.[15]

Limitations and future research

This study is cross-sectional and exploratory, with self-reported QoL and functional health responses likely to change over time. However, the least change may be reported in the respondent's morbidity pattern. Although this researcher followed standard study protocols in conducting this research work on a smaller sample, this work can only be generalized for the study area Varanasi of Uttar Pradesh but not for the district or state. However, the study can be extended to the other districts of Uttar Pradesh.

Some methodological consideration is needed to compare the data with other studies. To begin with, the definition of multimorbidity is heterogeneous, and there is diversity in including several chronic conditions, making it difficult to compare between studies.[36-37] However, the simple definition, the presence of two or more chronic conditions, is more common way to define multimorbidity.[38] Another important aspect is the collection of information regarding chronic conditions. Some studies use medical records to identify, whereas most researchers consider information reported by the respondent, also known as self-reported diagnosis.[39,40] It is noteworthy that self-report data has a potential bias in underestimating prevalence, but it is the most viable method for population-based epidemiologic studies.[37]

CONCLUSION

Prior research around the world has established a significant relationship between health conditions and the population's overall wellbeing. Chronic multimorbidity (presence of two and more chronic health conditions) is not just a condition that belongs to old age but involves lifestyle and behavioral changes that pre-emerge in adults aged 45 in determining the quality of life in old age. This analysis also supports the association of multimorbidity and QoL among older adults. Multimorbidity was more prevalent among females as they live longer but are dependent on their family members for healthcare treatment of their multiple chronic diseases resulting in poor QoL. Improving the health and quality of life of the growing older population has emerged as a major policy goal in changing morbidity patterns. Policy efforts are needed to offer financial security to elderly females.

Similarly, lifestyle factors were found to have significantly impacted QoL, highlighting the need for a campaign to create awareness to promote physical activity. The Indian traditional exercise method like yoga and meditation should also be actively promoted to maintain both physical and mental health. Apart from this, a healthy diet and avoiding risky behavior such as smoking, alcohol consumption, and the least indulgence in sedentary behavior are important for a healthy life. Yoga and physical exercise are more appropriate during the COVID-19 pandemic, where weak immune and unbalanced metabolism play an essential factor in the risk of falling sick.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Student Research Ethics Committee (SREC) of the International Institute for Population Sciences (IIPS)

REFERENCES

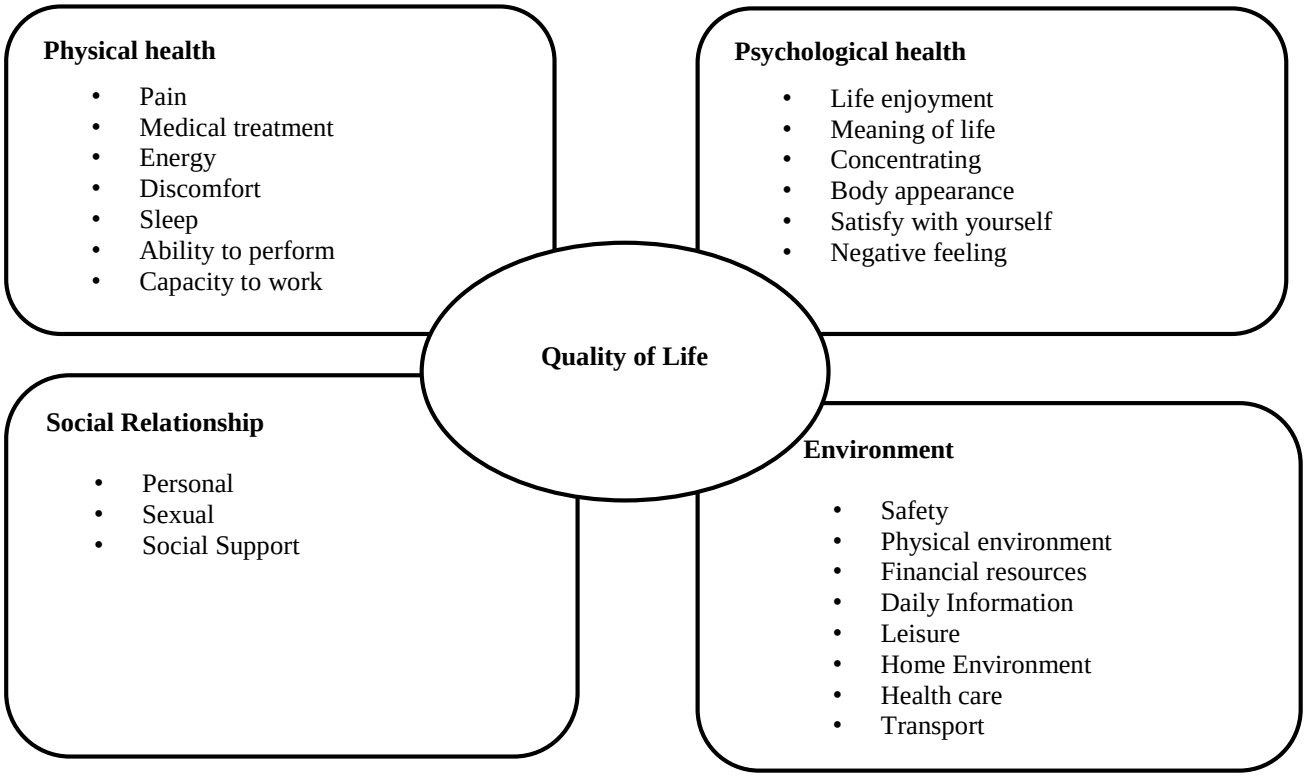
1. Raj D, Swain PK, Pedgaonkar SP. A study on quality of life satisfaction and physical health of elderly people in Varanasi: An urban area of Uttar Pradesh, India. Int J Med Sci Publ Health. 2014;3(5):616-20.
2. Arokiasamy P. India's escalating burden of non-communicable diseases. The lancet global health. 2018;6(12):e1262-3.
3. Fortin M, Dubois MF, Hudon C, Soubhi H, Almirall J. Multimorbidity and quality of life: a closer look. Health and quality of life outcomes. 2007;5(1):1-8.
4. Pati S, Agrawal S, Swain S, Lee JT, Vellakkal S, Hussain MA, et al. Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. BMC health services research. 2014;14(1):1-9.
5. Arokiasamy P, Uttamacharya U, Jain K, Biritwum RB, Yawson AE, Wu F, et al. The impact of multimorbidity on adult physical and mental health in low-and middle-income countries: what does the study on global ageing and adult health (SAGE) reveal? BMC medicine. 2015;13(1):1-6.
6. Aiden H. Multimorbidity. Understanding the Challenge; 2018.
7. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. Lancet. 2012;380(9836):37-43.
8. Zhou B, Chen K, Wang J, Wang H, Zhang S, Zheng W. Quality of life and related factors in the older rural and urban Chinese populations in Zhejiang province. J Applied Gerontology. 2011;30(2):199-225.
9. Singh JK, Ray SK, Basu AK. A Study of Quality of Life of Elderly People in the Tangra Area of Kolkata. InGlobal Public Health Conference. 2014;2014:240.
10. Dasgupta A, Pan T, Paul B, Bandopadhyay L, Mandal S. Quality of life of elderly people in a rural area of West Bengal: A community-based study. Med J. 2018;11(6):527.
11. Shah VR, Christian DS, Prajapati AC, Patel MM, Sonaliya KN. Quality of life among elderly population residing in urban field practice area of a tertiary care institute of Ahmedabad city, Gujarat. J Family Med Primary Care. 2017;6(1):101.
12. Thadathil SE, Jose R, Varghese S. Assessment of domain wise quality of life among elderly population using WHO-BREF scale and its determinants in a rural setting of Kerala. Int J Curr Med Appl Sci. 2015;7(1):43-6.
13. Registrar General and Census Commissioner of India. District Census Handbook Varanasi. New Deli; 2011.
14. Whoqol Group. Measuring quality of life. Geneva: The World Health Organization; 1997:1-3. Available at: http://apps.who.int/iris/handle/10665/63482. Accessed on 1 January 2017.
15. World Health Organization T. Global recommendations on physical activity for health. World Health Organization; 2010.
16. Pati S, Swain S, Hussain MA, van den Akker M, Metsemakers J, Knottnerus JA, et al. Prevalence and outcomes of multimorbidity in South Asia: a systematic review. BMJ Open. 2015;5(10):e007235.
17. Kumar D, Shankar H. Prevalence of Chronic Diseases and Quality of Life among Elderly People of Rural Varanasi. Int J Contemporary Med Res. 2018;5(7):G1-5.
18. Uddin MA, Soivong P, Lasuka D, Juntasopeepun P. Factors related to quality of life among older adults in Bangladesh: A cross sectional survey. Nursing Health Sci. 2017;19(4):518-24.
19. Nagarani SKR. A study on quality of life of elderly population in Mettupalayam, a rural area of Tamilnadu. Natl J Res Community Med. 2012;1:123-77.

20. Barua A, Mangesh R, Kumar HH, Saajan M. Assessment of the domains of quality of life in the geriatric population. Indian J Psychiatry. 2005;47(3):157.
21. Canbaz S, Sünter AT, Dabak S, Pekşen Y. The prevalence of chronic diseases and quality of life in elderly people in Samsun. Turkish J Med Sci. 2003;33(5):335-40.
22. Mini GK, Thankappan KR. Pattern, correlates and implications of non-communicable disease multimorbidity among older adults in selected Indian states: a cross-sectional study. BMJ open. 2017;7(3):e013529.
23. Jackson SE, Hackett RA, Steptoe A. Associations between age discrimination and health and wellbeing: cross-sectional and prospective analysis of the English longitudinal study of ageing. Lancet Public Health. 2019;4(4):e200-8.
24. Bao J, Chua KC, Prina M, Prince M. Multimorbidity and care dependence in older adults: a longitudinal analysis of findings from the 10/66 study. BMC public health. 2019;19(1):1-0.
25. Kshatri JS, Palo SK, Bhoi T, Barik SR, Pati S. Associations of multimorbidity on frailty and dependence among an elderly rural population: Findings from the AHSETS study. Mechanisms Ageing Development. 2020;192:111384.
26. Figueira HA, Figueira JA, Mello D, Dantas EH. Quality of life throughout ageing. Acta medica lituanica. 2008;15(3).
27. Ibrahim TM, Namir GA, Tariq SA, Nazar PS. Quality of life and morbidity pattern of Geriatric population in Erbil City. Middle East J Age Ageing. 2010;7:233-50.
28. Qadri SS, Ahluwalia SK, Ganai AM, Bali SP, Wani FA, Bashir H. An epidemiological study on quality of life among rural elderly population of Northern India. Int J Med Sci Public Health. 2013;2(3):514-22.
29. Ulloa BF, Møller V, Sousa-Poza A. How does subjective well-being evolve with age? A literature review. J Population Ageing. 2013;6(3):227-46.
30. Mondal NA, Kannaujiya AK, Ali B. Quality of Life of Elderly in Rural Murshidabad (West Bengal). Social Science Spectrum. 2020;5(1):42-9.
31. Garin N, Olaya B, Moneta MV, Miret M, Lobo A, Ayuso-Mateos JL, et al. Impact of multimorbidity on disability and quality of life in the Spanish older population. PloS one. 2014;9(11):e111498.
32. Vitorino LM, Paskulin LM, Vianna LA. Quality of life among older adults resident in long-stay care facilities. Revista latino-americana de enfermagem. 2012;20:1186-95.
33. Mini GK. Socioeconomic and demographic diversity in the health status of elderly people in a transitional society, Kerala, India. J Biosocial Sci. 2009;41(4):457-67.
34. Singh L, Arokiasamy P, Singh PK, Rai RK. Determinants of gender differences in self-rated health among older population: evidence from India. Sage Open. 2013;3(2):2158244013487914.
35. Vagetti GC, Barbosa VC, Moreira NB, Oliveira VD, Mazzardo O, Campos WD. Association between physical activity and quality of life in the elderly: a systematic review, 2000-2012. Brazilian J Psychiatry. 2014;36:76-88.
36. Holzer BM, Siebenhuener K, Bopp M, Minder CE. Evidence-based design recommendations for prevalence studies on multimorbidity: improving comparability of estimates. Population health metrics. 2017;15(1):1-9.
37. Diederichs C, Berger K, Bartels DB. The measurement of multiple chronic diseases - a systematic review on existing multimorbidity indices. J Gerontology Series A: Biomed Sci Med Sci. 2011;66(3):301-11.
38. Johnston MC, Crilly M, Black C, Prescott GJ, Mercer SW. Defining and measuring multimorbidity: a systematic review of systematic reviews. European J Public Health. 2019;29(1):182-9.
39. Violan C, Foguet-Boreu Q, Flores-Mateo G, Salisbury C, Blom J, Freitag M, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. PloS one. 2014;9(7):e102149.
40. Guisado-Clavero M, Roso-Llorach A, López-Jimenez T, Pons-Vigués M, Foguet-Boreu Q, Muñoz MA, et al. Multimorbidity patterns in the elderly: a prospective cohort study with cluster analysis. BMC Geriatrics. 2018;18(1).

Cite this article as: Himanshu, Arokiasamy P, Selvamani Y. Association between multimorbidity and quality of life among older adults in community-dwelling of Uttar Pradesh, India. Int J Community Med Public Health 2022;9:3197-208.

APPENDIX

Appendix A: WHOQOL-BREF framework



Source: Based on world health organization quality of life framework, 1997.

Appendix B: WHOQOL-BREF item-wise mean raw score among the study population of Varanasi, Uttar pradesh (n=500).

WHOQOL-BREF Item/Domains	Direction of Scaling	Mean Raw item score	Standard deviation (SD)
Q1. Overall quality of life	+	3.28	0.86
Q2. General Health	+	3.53	0.95
Domain 1: Physical Health (7-item)			
Q3. Pain	-	3.27	0.95
Q4. Medical treatment	-	3.75	1.05
Q10. Enough energy	+	3.13	0.96
Q15. Discomfort	+	3.15	0.98
Q16. Sleep	+	3.34	1.26
Q17. Ability to perform daily living activities	+	3.17	0.85
Q18. Capacity to work	+	3.13	0.93
Domain 2: Psychological Health (6-item)			
Q5. Life enjoyment	+	3.21	0.89
Q6. Meaningfulness of life	+	3.41	1.08
Q7. Thinking, learning, memory and concentration	+	3.15	1.04
Q11. Body appearance	+	3.21	1.02
Q19. Satisfy with yourself	+	3.37	1.05
Q26. Negative feelings	-	4.04	0.95
Domain 3: Social Relationship (3-item)			
Q20. Personal relationship	+	3.73	1.01
Q21. Sexual activity	+	0.9	1.48
Q22. Social support	+	3.25	0.92

Continued.

WHOQOL-BREF Item/Domains	Direction of Scaling	Mean Raw item score	Standard deviation (SD)
Domain 4: Environmental health (8-item)			
Q8. Freedom, physical safety and security	+	3.36	1.04
Q9. Physical environment	+	3.32	1.01
Q12. Financial resources	+	2.96	1.02
Q13. Daily information	+	3.12	0.94
Q14. Leisure	+	3.10	1.05
Q23. Home environment	+	3.20	0.93
Q24. Access to health care	+	3.21	1.03
Q25. Transport	+	3.19	1.04