

Association Between Multimorbidity and Quality of Life Among Older Adults in Community-Dwelling of Uttar Pradesh, India

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Abstract

Background

The rise in life expectancy and the share of older population represents the most significant demographic transformation in the twenty-first century. Increasing longevity with the coexistence of chronic multimorbidity makes the elderly population vulnerable to functional limitation, disability and more frequent hospitalization, resulting deterioration in QoL. The present study aims to investigate the association between non-communicable disease (NCD) multimorbidity and QoL among the older population in Varanasi, India.

Methods

A cross-sectional data of 500 individuals in the Varanasi district aged 50 + years were collected, using a multistage simple random sampling procedure from November 2017 to May 2018. WHOQOL-BREF was utilised to assess the quality of life of the study participants, and the important covariates used in the analysis are; age, sex, marital status, place of residence, health factors, socioeconomic status, and behavioral risk factors. 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 QoL scores decreased with age and was higher among females. Regression results show that demographic and lifestyle risk factors are closely associated with QoL. multimorbidity was significantly associated with reduced quality of life. Older adults with multimorbidity had 5 points lower quality of life than those with no chronic diseases.

Conclusions

Multimorbidity along with demographic and lifestyle factors are significantly associated with QoL. Healthcare programmes need to factor in multimorbidity while promoting a healthy and risk-free lifestyle to control modifiable risk factors. Government assistance is necessary for the most economically dependent older population for their day-to-day needs.

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 [1] and a rising prevalence of chronic diseases [2]. In 2012, on World Health Day, WHO stated as 'Good health adds life to years, highlighting the importance 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 [3], higher healthcare costs [4], and functional limitations and poor mental health [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 [7] and poor QoL [3] as well as elder abuse [8]. 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 [9]. 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 negatively impact the health and wellbeing of the elderly [10, 11]. Concurrent empirical studies suggest the impact of socioeconomic status on the physical environment and, subsequently, health outcomes [5, 12].

A growing body of literature has investigated the QoL of the elderly in the developed countries as the QoL is a subjective phenomenon and cannot be directly measured. Research on QoL remains neglected in developing countries and in low resource setting. Very few studies have been conducted within India in understanding the association between multimorbidity and QoL in the geriatric population [1, 13–16]. 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 among the Varanasi district of Uttar Pradesh

Methods

Sampling design

For the present study primary data was collected in Varanasi district of Uttar Pradesh state, India, 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 composition 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 [17]. 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.

Outcome variable

Quality of Life

In the present study, the QoL (overall wellbeing) is the outcome variable. The WHOQOL-BREF questionnaire has shown a good, reliable and valid cross-cultural measure for assessing QoL [18]. 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 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 [19]. 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 [20]. 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.

Predictor variables

Three sets of independent variables were used to assess their effects on QoL, namely demographi, health, socioeconomic factors and lifestyle factors.

- i. Demographic and health factors included are: a) Number of disease (no disease, one disease & two or more diseases), b) Self-rated health (good SRH & poor SRH), c) Age (50-59, 60-69, & 70+), d) Sex (male & female), and e) marital status (currently married & widowed).
- ii. The socioeconomic factors included are: a) years of schooling (illiterate, 1-5 years, 6-9 years and 10 and above), b) religion (Hindu & Muslim), c) caste (Scheduled Caste (SC)/Scheduled Tribes (ST), Other Backward Class (OBC), & others), d) residence (rural & urban), e) wealth index (poor, middle, & rich), and f) economic independence (totally dependent, partially dependent & independent).
- iii. The lifestyle and health factors included are:
 - a) 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 failed kept as doing insufficient physical activity [21]
 - b) sedentary behavior marked those having more than 4 hours of a day on sitting in leisure time activity (yes & no).

Ethical considerations

The study was approved by the Student Research Ethics Committee (SREC) of 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.

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-test and variance analysis (ANOVA) were used to test differences in the mean QoL score of multimorbidity and sociodemographic 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 [22].

Results

Sample distribution of the study population by socioeconomic profile

Table 1 shows the study participants socioeconomic and demographic characteristics. 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. The prevalence of multimorbidity in the study population was 18.4%.

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

Background characteristics	Sample	Percentage
Age		
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 SRH	409	81.8
Poor SRH	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

Background characteristics	Sample	Percentage
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
Sedentary Behaviors		
Yes	158	31.6
No	342	68.4
Total	500	100%

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 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 ($\alpha = 0.42$) domain. The physical domain's alpha value was 0.77 and 0.82 for the psychological domain, which showed that the variables were consistent.

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	17.86	100	56.94	16.37	0.77	230	46.0
Psychological Health	6	8.33	100	59.91	18.2	0.82	210	42.0
Social Relationship	3	8.33	100	40.63	19.8	0.42	132	26.4
Environment	8	9.38	100	54.54	17.3	0.84	243	48.6

Domain-specific quality of life score (QoL) by living arrangement with interaction of marital status and sex

Table 3 shows domain-specific QoL score by living arrangement. Older adults living with their spouse and children had a higher mean score for physical, psychological, social and environmental domains, followed by older adults living with spouse only in all domains. For the physical domain, the mean score was 60 among those living with their spouse and children, whereas, among those living alone, the mean score was the lowest of 48.7. Similarly, for the psychological, social and environmental domains, the

score was highest among older adults living with their spouse and children, followed by those living with their spouse. These findings show the importance of family and neighbourhood circumstances in determining the quality of life in old age.

Further, older adults without a spouse and living with children and others reported the lowest physical and social domain scores, demonstrating the spouse's role in their social life and the physical domain of quality of life. The lowest mean QoL's score for the psychological domain was 49.5 among those staying alone. In contrast, the mean score was lowest in the social domain among those living with their children or others. The mean score for the environmental domain was 58.4 among those living with their spouse and children and was the lowest among those living alone (44.1).

Table 3
Mean score between Quality of life domain and living arrangement among the older adults, Varanasi, Uttar Pradesh (N = 500)

	<i>Physical</i>	<i>Psychological</i>	<i>Social</i>	<i>Environment</i>	Overall QoL	Sample
Living alone	48.7	49.5	31.2	44.1	61.2	8
With Spouse only	56.1	54.7	40.0	50.4	67.6	30
Spouse with children	60.1	64.1	46.1	58.4	73.5	307
Children & others	51.3	53.2	30.4	48.2	64.4	155
Total	56.9	59.9	40.6	54.5	70.1	500

Table 4 shows the domain-wise mean score of QoL by gender and marital status. Married males had a higher mean score for all given domains. whereas, widowed males reported a higher mean score for the physical domain than married females. Importantly, widowed women reported the lowest mean score for all four domains as well overall QoL score

Table 4
Association between Quality of life domain by marital status and sex.

	<i>Physical</i>	<i>Psychological</i>	<i>Social</i>	<i>Environment</i>	Overall QoL	Sample
Married Male	61.6	64.9	46.4	58.0	74.2	195
Married Female	57.0	61.3	44.6	57.4	71.4	137
Widower	59.4	60.3	37.0	55.8	70.7	62
Widow	46.8	48.6	27.0	43.7	60.6	106
Total	56.9	59.9	40.6	54.5	70.1	500

Table 5 presents the domain-specific disability score by selected chronic diseases among the study population. The mean score for the physical domain was 56.9, and the lowest for hypertension (49). The mean score for the psychological domain was 59.9, which was higher among hypertensive respondents (56.1) and lower among those with COPD (40.3). Similarly, the social domain mean score was 40.6 with the lowest for those with asthma (32.8), and highest for those with arthritis (41.4). The mean environmental domain score was 54.5, where the lowest environmental domain score was for those with COPD (47.3) and the highest for those with arthritis (52.8). However, the differences were small in the overall QoL score by chronic conditions, except those with COPD and asthma (63.6) who reported lower quality of life scores.

Table 5

Association of Quality of life domain score by selected self-reported morbidity among older adults, Varanasi, Uttar Pradesh (N = 500)

Morbidity Status	Physical Domain	P-value	Psychological Domain	P-value	Social Domain	P-value	Environmental Domain	P-value	Overall QoL	P-value
Arthritis										
No	58.3		60.8		40.5		54.9		70.8	
Yes	50.9	***	56.0	**	41.4		52.8		67.1	**
Diabetes										
No	58.0		60.6		41.1		55.2		70.8	
Yes	49.3	***	54.6	**	37.2		49.7	*	65.1	**
COPD										
No	57.6		60.7		41.0		55.1		70.7	
Yes	49.3	**	50.4	***	36.0		47.3	**	63.6	**
Asthma										
No	58.2		61.0		41.8		55.4		71.1	
Yes	48.2	***	52.2	***	32.8	***	48.9	**	63.6	***
Hypertension										
No	58.5		60.7		41.6		55.0		70.9	
Yes	49.0	***	56.1	*	35.7	**	52.2		66.1	**
Total	56.9		59.9		40.6		54.5		70.1	

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

Table 6 shows the mean QoL score by background characteristics. The overall mean QoL score declining association 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 with the highest among older adults in 50–59 age groups, followed by those aged 60–69 and lowest among those aged 70 and above. 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 unmarried (64.3). Those who reported good self-rated health had 10-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 belonging to Scheduled caste or tribe had lower mean QoL scores, while those belonging to Other backward castes and other castes had higher QoL scores.

The mean QoL was 67.0 among respondents in the poorest wealth quintile, 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.

Table 6
Mean QoL score (26-item) by chronic diseases and selected background characteristics in Varanasi District of Uttar Pradesh (N = 500)

Demographic & health factors	Overall mean QoL [± SD]	Sample
Number of Chronic Diseases	F = 24.31; p-value = 0.000	
No Disease	73.7[± 13.0]	257
Anyone disease	68.1[± 12.7]	151
≥ 2 disease	63.5[± 12.0]	92
Age	F = 29.19; p-value = 0.000	
50–59	75.0[± 12.3]	191
60–69	69.3[± 12.6]	177
≥ 70 year	64.2[± 13.2]	132
Sex	t = 5.77; p-value = 0.000	
Male	73.4[± 12.9]	257
Female	66.7[± 12.9]	243
Marital Status	t = 7.30; p-value = 0.000	
Currently married	73.1[± 13.7]	332
Otherwise	64.3[± 10.3]	168
Self-Rated Health	t = 7.11; p-value = 0.000	
Good SRH	72.0[± 13.1]	409
Poor SRH	61.6[± 10.8]	91
Socioeconomic Factors		
Year of schooling	F = 13.71; p-value = 0.000	
Illiterate	67.7[± 13.0]	225
1–5 year	67.8[± 13.5]	111
6–9 year	73.2[± 13.1]	86
≥ 10 year	77.3[± 10.9]	78
Religion	t = 2.32; p-value = 0.021	
Hindu	70.8[± 12.9]	407
Muslim	67.3[± 14.7]	93
Caste	F = 3.13; p-value = 0.045	
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

<i>Demographic & health factors</i>	Overall mean QoL [\pm SD]	Sample
Wealth index	F = 15.77; p-value = 0.000	
Poor	67.0[\pm 13.6]	167
Middle	68.8[\pm 13.1]	167
Rich	74.6[\pm 12.1]	166
Economic Independence	F = 37.10; p-value = 0.000	
Totally Dependent	65.5[\pm 12.0]	203
Partially dependent	69.5[\pm 13.2]	145
Independent	77.0[\pm 12.3]	152
Lifestyle & risk factors		
Physical Activity	t=-11.34; p-value = 0.000	
Sufficient	75.4[\pm 11.6]	283
Insufficient	63.2[\pm 12.2]	217
Sedentary Behaviors	t = 8.95; p-value = 0.000	
Yes	62.8[\pm 10.6]	158
No	73.5[\pm 13.1]	342
Total	70.13[\pm 13.3]	500

SD = Standard Deviation

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

Results of multivariate regression analysis for the association of sociodemographic, health, risk factors with QoL are presented in Table 7. All results are presented with a .05 level of significance. Both age and multimorbidity (β = -3.05; CI = -5.78: -0.31) 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 had 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 quintile (β = 4.54; CI = 2.0: 7.0) had significantly higher quality of life than those in the poorest wealth quintile. Economically independent respondents had (β = 3.71; CI = 0.7: 6.7) had significantly higher quality of life score than the economically dependent respondents.

Table 7

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 [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	
50–59	Ref
60–69	-3.75**[-6.09 : -1.42]
≥ 70 year	-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
Upto 5 years	-2.82*[-5.34 : -0.3]
up to 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]
Note: @= Reference; *** p < 0.001, ** p < 0.01, * p < 0.05	

Background characteristics	β -Coeff [CI]
Wealth index	
Poor	Ref
Middle	1.87[-0.48 : 4.22]
Rich	5.41***[2.86 : 7.95]
Economic Independence	
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	

Discussion

In this study, we used WHO-BREF for assessing the QoL among the study population. The overall mean QoL of 70.1 ± 13.3 , is 10 points higher than QoL score reported in a previous study conducted in the Varanasi district's rural area [23]. However, a study conducted in Bangladesh reported a similar level of QoL among the elderly [24]. The inclusion of older adults aged 50 + instead of elderly population aged 60-plus may be part of the reason for higher overall mean QoL .

Our findings showed that chronic morbidity was significantly associated with low QoL scores among the elderly population. This finding is consistent with other studies conducted in India and other countries where the presence of chronic diseases were found significantly associated with lower quality of life [13, 23, 25–27].

The presence of chronic diseases has a significant impact on the individual on economic deterioration and functional limitation, which is further associated with lower quality of life. Chronic multimorbidity are 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 health is strongly evident [5] with deteriorating quality of life. In addition, multimorbidity is closely linked with elder abuse [8, 29] and care dependence [30, 31]. As a result, the elderly with multimorbidity are more likely to experience a lower quality of life.

The mean QoL score was higher among males and currently married, consistent with previous findings [23, 32–35]. Also, Barua et al. (2005) showed that currently married elderly had better QoL scores than those not currently married [26]. Living with a partner or spouse is important in protecting QoL old age. Age was found negatively associated with QoL, consistent with the studies [23, 36–38]. However, other studies conducted in higher-income countries showed insignificant association between age and QoL [39, 40].

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 [23, 25, 26, 35]. A study conducted in Kerala reported a similar mean social domain score [16].

Living arrangements showed a significant role in determining QoL. Consistent with other studies, those living with a spouse had better QoL than others [16, 23, 41]. Married males than females had a higher mean score for all given domains. Interestingly, for the physical domain, widowers reported a higher mean score compared to married females. 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.

In this study, education attainment showed a significant association with quality-of-life scores consistent with previous literature [23, 38, 42]. Similarly, the study results showed that those in the higher wealth quintile reported better QoL than those in lower wealth quintiles [23]. Our finding showed that respondents reporting financial 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 [43, 44]. This may be due to economically independent people engaged with their occupation was less bothered about their minor health problem.

The role of physical activity was profound in determining the QoL. Consistent with the previous systematic review reported by Vagetti et al. [45], physical activity was positively and consistently associated with QoL. This can also be understood with the norm that promoting physical activity will impact beyond physical health WHO recommended that older adults should have engaged at least 150 minutes of moderate or 75 minutes of the vigorous level of physical activity for healthy ageing [21].

Limitations And Future Research

This study is cross-sectional and exploratory with self-reported responses on QoL and functional health likely to change over time. However, the least change may be reported in 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 [46, 47]. However, the simple definition, the presence of two or more chronic conditions is more common way to define multimorbidity [48]. 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 diagnosed [49, 50]. 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 [47].

Conclusion

Prior research around the world has established a significant relationship between health conditions and the overall wellbeing of the population. 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 health and quality life of the growing older population has emerged as a major policy goal with changing morbidity patterns. Policy efforts are needed to offer financial security to elderly females.

Similarly, lifestyle factors were found to have impacted QoL significantly, highlighting need for a campaign for creating 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.

Abbreviations

QoL
Quality of Life
NCD
Non-communicable disease
WHOQOL
World Health Organization Quality of Life
SRH
Self Rated Health
OBC
Other Backword Caste
Sc
Scheduled Caste
St
Scheduled Tribe.

Declarations

Ethics approval and consent to participate

The current work is based on the first author's PhD work, and the necessary permission was obtained from the Students Research Ethics Committee (SREC) of International Institute for Population Sciences (IIPS), Mumbai (Sr.No. 15/1843, Date:13/10/2017). All respondents in the study were given complete information about the survey's aim and procedure. The study was carried out in accordance with the guideline of the Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subject. The interview was conducted only after their requisite written or oral consent and were informed that they could withdraw from the study at any stage. The interview was conducted at a time that was convenient for the respondents. All information collected was kept confidential and used only for research purposes.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

H. contributed to the conceptualization, study design, data collection and analyzed the study data. H and YS contributed to extensive literature review and writing of the manuscript. H, PA and YS contributed to finalising the manuscript, subsequent revisions, and all authors have read and approved the final manuscript for submission.

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