Understanding Life Satisfaction of the Elderly with Multi-morbidity in India: Insights from the Longitudinal Ageing Study in India (LASI) Wave-1

Subham Sharma[1]*   *Dhananjay W. Bansod[1]*

1. Department of Public Health and Mortality Studies, International Institute for Population Sciences, Mumbai, India- 400088

* Corresponding author - Subham Sharma, email address – subhamsharma123007@gmail.com

Introduction

Worldwide, the population of people aged 60 and older is expected almost to double between 2015 and 2050, reaching around 2.1 billion *(United Nations, 2015)*. In low- and middle-income countries, the burden of chronic illnesses has emerged as a public health problem, with significant consequences for primary and secondary care providers. India has been witnessing an unprecedented change in the demographic and social structure in recent decades. India is experiencing an epidemiological transition that witnesses a rising burden of non-communicable diseases (NCDs) *(Khan et al., 2022)*. Also, the burden of multiple comorbid conditions, i.e., multimorbidity is rapidly increasing due to longer lifespans and increased exposure to risk factors for chronic illnesses *(Barik et al., 2022)*. Multimorbidity, identified as two or more chronic conditions occurring in the same individual at the same time, is becoming more of an issue, particularly in countries where the population is rapidly ageing *(Arokiasamy et al., 2015).*

Recently, the issue of subjective well-being among chronically ill older adults has started to gain importance because chronic conditions in old adults cause unfavourable problems, such as reduced functional status, increased financial burden, and increased stress that could affect the well-being and quality of life of older persons *(Foong et al., 2020)*. Chronic diseases affect one's attitude toward life as the number of chronic diseases affects the quality of life *(Pan et al,2020)*. Chronic diseases will affect the elderly life satisfaction indirectly, through their financial condition. Studies showed that the economic condition of the elderly is one of the factors to determine the elderly who have chronic disease discipline in medical treatment *(Methasari & Krisnatuti, 2018).*

Life satisfaction is defined as the overall subjective evaluation of one's own life. Life satisfaction is an integral part of healthy ageing and is an emerging public health concern *(United Nations, 2020)*. Life satisfaction is often used as an indicator to measure successful ageing *(García et al., 2011)*, which is characterized by physical health, mental functioning, socially active, and financially secure *(Eshkoor et al., 2015)*. This concept is a central theme of gerontology and gerontologists attempt to assist older people to age well. It is important to support the elderly to maintain a high level of life satisfaction, as the elderly with high life satisfaction tend to be more emotionally positive, maintain good health, and have a lower risk of mortality *(Bai et al., 2018)*.

As per the WHO, four factors that directly influence the level of life satisfaction among the elderly are physical health condition, mental health condition, social relationships, and environment *(Efklides et al., 2003)*. For improving life satisfaction among the elderly, it is necessary to consider factors like satisfaction in the residential environment, neighbourhood relationships, economic status, maintaining friendships, family relationships, physical health condition, satisfaction in marital status, job or career, and lastly, satisfaction in others aspect of life *(Han & Hong, 2011)*. Socio-demographic factors include education, marital status, income, employment, and religious participation *(Kolosnitsyna et al., 2017)*. Health-related factors such as physical activity and depression are also important factors *(Banjare et al., 2015)*.

Life satisfaction and the factors contributing to well-being in old age constitute a major concern for the older population and gerontological research. However, very little is known about how elderly people with multimorbidity subjectively evaluate their lives and the factors that affect their life satisfaction.

Given this background, more knowledge is needed about factors contributing to life satisfaction in older adults living with multiple chronic conditions. Such knowledge may stimulate the development of intervention strategies to help older adults maintain and improve their life satisfaction despite multiple chronic conditions. Hence, to fill this gap, the present study aimed to explore the levels and determinants of the life satisfaction of the elderly with multimorbidity in India.
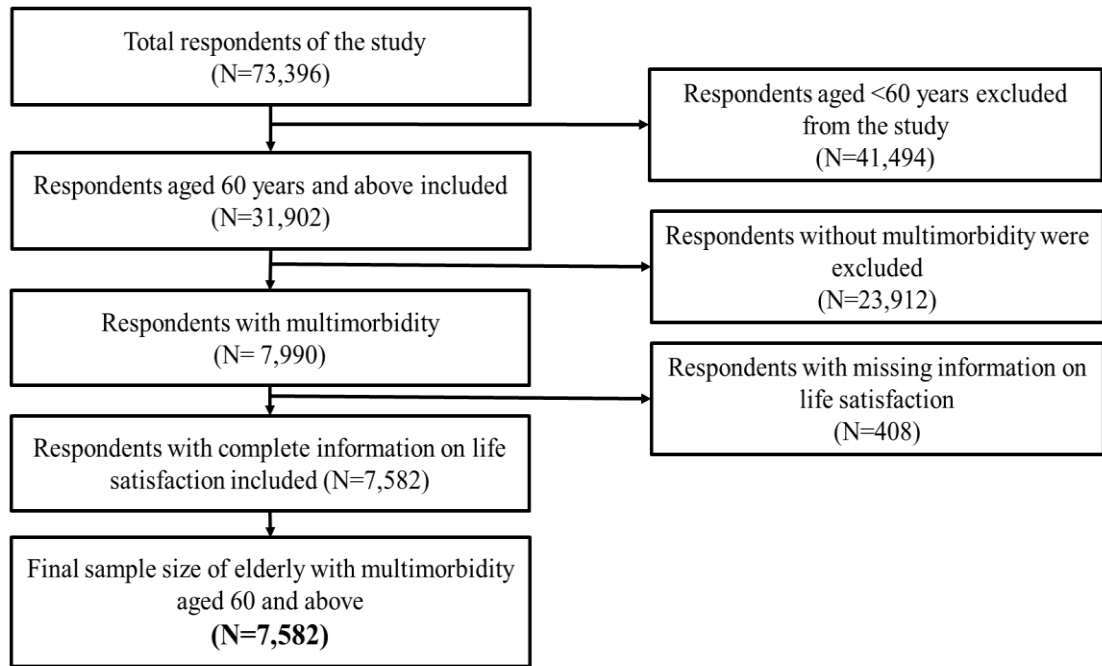
Materials and Methods

Data source

Data for this study is collected from the first wave of the Longitudinal Ageing Study in India (LASI) 2017‑18. It is a full-scale national survey of scientific investigation of the health, economic, and social determinants and consequences of population ageing in India. The first wave of the survey covered 73,396 older adults aged 45 and above and their spouses, irrespective of their ages, even under 45 years, across all states and union territories of India including Sikkim. A multistage probability stratified area cluster sampling design was adopted to arrive at the eventual units of observation. Detailed information on the survey design, instruments used, and data collection can be accessed from the LASI India Report.

Study Sample

The overall sample size of LASI is 73,396 individuals aged 45 and above. However, this study only focuses on older adults aged 60 years and above; hence 41,494 respondents aged less than 60 years were dropped from the study. Among 31,902 aged 60 or more, 7990 elderly with multimorbidity i.e., those elderly who had two or more chronic diseases simultaneously (hypertension, chronic heart diseases, stroke, any chronic lung disease, diabetes, cancer or malignant tumour, any bone/joint disease, any neurological/psychiatric disease, and high cholesterol) were included and respondents without multimorbidity were excluded. Then the respondents with complete information on life satisfaction were included and the missing cases were excluded. Thus, the final sample size of 7,582 elderly aged 60 and above with multimorbidity was included in the study (figure 1).

Total respondents of the study
(N=73,396)

Respondents aged <60 years excluded
from the study
(N=41,494)

Respondents aged 60 years and above included
(N=31,902)

Respondents without multimorbidity were
excluded
(N=23,912)

Respondents with multimorbidity
(N= 7,990)

Respondents with missing information on
life satisfaction
(N=408)

Respondents with complete information on life
satisfaction included (N=7,582)

Final sample size of elderly with multimorbidity
aged 60 and above
(N=7,582)

Figure 1: Flow chart of the study sample selection

Variables Description

Outcome Variable

In LASI, life satisfaction was assessed using five items: (i) In most ways my life is close to ideal; (ii) The conditions of my life are excellent; (iii) I am satisfied with my life; (iv) So far, I have got the important things I want in life; and (v) If I could live my life again, I would change almost nothing. The responses for all five questions were collected on a 1 to 7 Likert scale in which 1 to 7 values were coded as "Strongly disagree", "Somewhat disagree", "Slightly disagree", "Neither agree nor disagree", "Slightly Agree", "Somewhat Agree", and "Strongly Agree" respectively. This scale was derived from Satisfaction with Life Scale (SWLS) instrument. The internal consistency of the scale was checked using Cronbach's alpha. The Cronbach's alpha value was 0.90, indicating a very high internal consistency/reliability. The final life satisfaction variable was constructed by adding the above-mentioned five items. The life satisfaction variable was a continuous variable with a range of 5 to 35, a mean value of 23.90, and a standard deviation of 7.81. Higher values of the variable reflect higher life satisfaction *(Diener et al., 1985)*.

Explanatory Variables

The explanatory variables were categorized under four categories namely, socio-demographic factors, socio-cultural factors, health behavioural factors, and health status factors.

- ### Socio-demographic factors

Age (60-69, 70-79, and 80+ years), Sex (males and females), Place of Residence (rural and urban), Marital Status (currently married, widowed, and others), Religion (Hindu, Muslim and others), Caste (SC, ST, OBC, and others), MPCE Quintile (poorest, poorer, middle, richer, richest), Living Arrangement (living alone, living with family and living with others), Working Status (currently working and not working).

- ### Socio-cultural factor

Social participation is used as a socio-cultural factor in this study. Social participation is based on responses to six questions asking the frequency of attending organizations, clubs, or society's meetings/gatherings; visiting relatives/friends; attending cultural performances, shows, or cinema; attending religious functions/events such as bhajan, Satsang or prayer; attending political, community or organization group meetings; and meeting with friends. Frequency was coded as 0 for never attending/visiting/meeting, 1 for at least once a year, 2 for at least once a month, 3 for at least once a week, and 4 for daily. The social participation score is the sum of all these codes. Higher the score means higher the participation. Further, we categorized this into three equal parts, i.e., first, second, and third terciles *(Rana et al., 2022).*

Thus, social participation is categorized as low participation, medium participation, and high participation.

- ### Health Behavioural factors

Use of Tobacco (Smoked/Smokeless) (yes/no), Alcohol Consumption (yes/no) and Physical Activity (yes/no)

- ### Health Status Factors

Self-Rated Health (poor, fair, and good), Depression (yes/no)

Statistical Analyses

Descriptive statistics and bivariate analysis were employed to understand the socio-demographic and health profiles of the study participants. The Chi-square test was used to examine the significance of possible associations among variables. A multivariate linear regression analysis was conducted to understand the predictors of life satisfaction among the elderly with multimorbidity. The normality assumption of multivariate linear regression was checked using the Jarque-Bera test of normality. The heteroscedasticity was checked using the Breusch-Pegan Test. Variance inflation factors (VIF) were estimated with a cut-off value of 10 to check potential multicollinearity. Hence, there was no violation of the assumptions of the multivariate linear regression.

Results

Socio-demographic and health profile of the elderly with multimorbidity

Table 1 presents the socio-demographic profile of the elderly with multimorbidity. The majority of the study participants were aged 60‑69 years (58%), living in rural areas (51%), were female (55 %), had no education (42%), belonged to the richest wealth quintile (26%), were currently married (63%), belonged to OBC (40%) belonged to the Hindu religion (71%), were living with family (90%) and were not working (83%). Most of the participants were non-smokers (85%) and had not consumed alcohol (68%). The majority of the participants had reported good self-rated health (39%) and were non-depressed (91%)

Mean Life Satisfaction Score of the elderly with multimorbidity in India

Table 2 presents the mean life satisfaction score of the elderly with multimorbidity in India. The overall mean ($\overline{x}$) life satisfaction score (total score ranges 5-35) was 23.90 (SD = 7.81). Elderly individuals living in urban areas exhibit higher mean life satisfaction scores ($\overline{x}$ = 25.13) compared to those in rural areas ($\overline{x}$ =22.95). There is a minimal difference in mean life satisfaction between males ($\overline{x}$ =23.85) and females ($\overline{x}$ =23.95). The mean life satisfaction score increases as the education as well income levels increase. The elderly belonging to the richest MPCE quintile had the highest mean life satisfaction score ($\overline{x}$ =25.13:SD=7.51) compared to

that of the poorest MPCE wealth quintile ($\bar{x}$ =22.01:SD=7.65). The elderly belonging to the Hindu religion had higher life satisfaction compared to the other religions. Those multimorbid elderly living with the family had higher mean life satisfaction scores ($\bar{x}$=24.21:SD=7.69) than those who are living alone ($\bar{x}$=20.57: SD=8.21). Those elderly who are currently married had higher mean life satisfaction than those widowed/divorced /separated. Interestingly, higher life satisfaction was found among those elderly who are not currently working. The elderly who participated in sociocultural activities exhibited higher mean life satisfaction scores ($\bar{x}$=25.10: SD=7.41) than those who had low participation ($\bar{x}$=22.75:SD=8.29). The elderly with good self-rated health reported higher life satisfaction ($\bar{x}$=25.04: SD=7.29) compared to those who had poor self-rated health ($\bar{x}$= 21.48:SD=8.09). The elderly who were engaged in physical activities reported higher life satisfaction than their counterparts. The elderly who neither drank alcohol nor smoked had reported a higher level of life satisfaction. Those elderly who reported depression tend to have significantly lower mean life satisfaction scores ($\bar{x}$ =20.07: SD=9.03) compared to those without depression ($\bar{x}$=24.37: SD=7.51).

Table 3 presents the state-wise distribution of the mean life satisfaction score of the elderly with multimorbidity. The national mean life satisfaction score was found to be 23.90 for the elderly with multimorbidity. The higher mean life satisfaction score was reported in Gujarat, followed by Maharashtra, and Himachal Pradesh while the lower mean life satisfaction score was reported in the states of Rajasthan, Andhra Pradesh, and Telangana.

<u>Determinants of life satisfaction among elderly with multimorbidity in India</u>

Table 4 shows the result of the multivariate linear regression analysis which determined the factors affecting the life satisfaction of the elderly with multimorbidity. It was found that the elderly aged 80 years or more were significantly associated with increased life satisfaction (β Coef. =0.84: p = 0.004: CI= 0.26-1.42) than other age groups. Females had significantly higher life satisfaction than males. Life satisfaction was significantly associated with the education level (β Coef. =2.84: p = 0.000: CI= 2.21-3.46) for higher education. Those who belong to the general caste had significantly higher levels of life satisfaction (β Coef. =0.98: p = 0.004: CI= 0.45-1.52) than SCs, STs, and OBCs. The wealth quintile was found to be significantly associated with the life satisfaction of the elderly. Those who belong to the richer or richest quantile had higher levels of life satisfaction (β Coef. =1.14: p = 0.000: CI= 0.59-1.69) as compared to the poorest wealth quantile. Living arrangement was significantly associated with the life satisfaction of the elderly. Those who were living with their family reported higher life

satisfaction (β Coef. =1.62: p = 0.000: CI= 0.82-2.42) as compared to those who were living alone or living with others. Social participation was significantly associated with higher life satisfaction (β Coef. =0.72: p = 0.001: CI= 0.31-1.12). Self-rated health was also found to be significantly associated with the life satisfaction of the elderly. Good self-rated health was found to be significantly associated with higher life satisfaction (β Coef. =2.88: p = 0.000: CI= 2.45-3.31) than poor or fair self-rated health. Physical activity was also found to be significantly associated with life satisfaction. The prevalence of depression was also found to be significantly and negatively associated with the life satisfaction of the elderly. Those who didn't have any depression were found to have higher life satisfaction (β Coef. =2.44: p = 0.000: CI= 2.08-3.21) than their counterparts. Factors like religion, working status, and tobacco or alcohol consumption were not found to be statistically significant.

Discussion

This study determined the factors affecting the life satisfaction among the elderly with multimorbidity. By examining a diverse range of demographic, socioeconomic, and health-related factors, we have identified key predictors that significantly influence life satisfaction in this vulnerable population. Age, Sex, education, income, living arrangement, marital status, caste, self-rated health, social participation, physical exercise, and depression were found to be the significant factors affecting the life satisfaction of the elderly with multimorbidity.

The elderly aged 80+ had significantly higher life satisfaction than the elderly aged 60-69 and 70-79 which was similar to other studies *(Mustafa, 2022).* This finding was supported by the socioemotional selectivity theory proposes that people get happier and more satisfied as they get older. According to the theory, as people enter into later years of life, they become increasingly conscious of the amount of remaining time in their life. They become more mindful of savouring the present moments as a result of their growing mortality awareness *(Löckenhoff & Carstensen, 2004)*.

Although very little gender difference is found in life satisfaction among multi-morbid elderly. The regression analysis showed that women had significantly higher life satisfaction than men. This result is found to be consistent with the other studies. Eckermann (2012) suggests that resilience is a key factor accounting for women's higher scores on life satisfaction *(Eckermann, 2012).*

Education emerges as a robust predictor of life satisfaction, with higher levels of education associated with higher levels of satisfaction. This highlights the role of education in fostering cognitive abilities, socioeconomic opportunities, and access to resources that contribute to overall well-being. The findings of some studies were consistent with the present study *(Papi & Cheraghi, 2021)*. Previous studies have shown that higher levels of education are associated with better socioeconomic status in society and a higher quality of life, both of which may increase a person's sense of fulfilment in life *(Ngoo et al., 2015)*.

Wealth quintile also exerts a significant influence on life satisfaction, with individuals in higher wealth quintiles reporting higher levels of satisfaction. This suggests the importance of economic security, financial resources, and access to amenities in shaping subjective well-being among older adults with multimorbidity. Efforts to address socioeconomic inequalities and promote equitable access to resources are therefore essential for improving well-being outcomes in this population. Higher levels of MPCE quantile show better economic stability and fewer financial vows, which are vital aspects of life, especially in old age *(Ngoo et al., 2015)*. Hence, it is justified to obtain a positive association between the MPCE quantile and life satisfaction. Similar results were found in previous studies as well *(Dumith et al., 2021)*.

Living arrangement and marital status are significant predictors of life satisfaction, with individuals living with family and currently married individuals reporting higher levels of satisfaction compared to those living alone or with others. These findings are consistent with the other studies. This highlights the importance of social relationships, support networks, and social integration in enhancing their satisfaction with life. The bonding with family bond was associated with higher life satisfaction. Due to a familial sense of togetherness, family ties contribute to higher emotional well-being and, subsequently, greater satisfaction. Supportive environments can be obtained from families such as spouses, children, and grandchildren. This environment provides life satisfaction for the elderly, although they suffer from chronic diseases *(Methasari & Krisnatuti, 2018)*.

Social Participation is found to be a significant predictor of the life satisfaction of the elderly. Those who are actively involved in socio-cultural activities had higher life satisfaction. This finding aligns with previous studies, indicating consistency in the relationship between social participation and life satisfaction among the elderly *(Baeriswyl & Oris, 2023)*. Participation in community events and religious gatherings fosters a sense of belonging and connectedness,

reducing feelings of loneliness and depression. Social support networks also provide practical assistance and emotional encouragement, enhancing life satisfaction.

Self-rated health emerges as a strong predictor of life satisfaction, with individuals reporting good or fair health exhibiting higher levels of satisfaction compared to those reporting poor health. The finding is consistent with past international studies conducted in numerous countries *(Kööts–Ausmees & Realo, 2015)*. SRH indicates one's assessment of his/her current overall health. So, the findings of this study suggest that if a person feels good about his health, it is likely that he/she will feel comparatively more satisfied with his life, and vice versa *(Rajabi Gilan et al., 2021)*.

Depression also exerts a significant negative impact on life satisfaction, with individuals reporting depression exhibiting substantially lower satisfaction scores compared to those without depression. These findings were consistent with other studies *(Kim et al., 2021).* This underscores the interconnectedness of mental and physical health in shaping subjective well-being and highlights the need for integrated approaches to address both aspects of health in older adults with multimorbidity.

Therefore, this study found education, wealth, social participation, living arrangements, and health status emerge as robust predictors of life satisfaction among the elderly with multimorbidity. Policymakers should focus on health literacy, reducing income disparities, and encouraging social engagement through community-based programs. By fostering environments conducive to health, social inclusion, and personal fulfillment, society can empower them to age gracefully and enjoy a satisfying and meaningful life despite the challenges posed by chronic illness and advancing age.

Limitations of the study

However, the study also had some limitations. The cross-sectional design of the study limits the ability to establish causal relationships between predictor variables and life satisfaction outcomes. The study relies on self-reported measures of life satisfaction, which may be subject to recall bias and social desirability bias. Objective measures of well-being, such as clinical assessments or observational data, could provide additional insights. Future research should employ longitudinal methodologies, incorporate objective measures, and adopt qualitative approaches to provide a better understanding of life satisfaction dynamics among older adults

with multimorbidity. Apart from the factors used in this study, other factors that may affect the life satisfaction of elderly living with multimorbidity can be explored.

Conclusion

This study provides comprehensive insights into the factors influencing the life satisfaction of the elderly population living with multimorbidity. By examining a wide range of demographic, socioeconomic, health-related, and psychosocial factors, this study identified key determinants that significantly impact the life satisfaction of this vulnerable population. The implications of our findings extend beyond academic research to inform policy and practice aimed at improving the well-being of older adults with multimorbidity. Addressing socioeconomic disparities, fostering social connections, and integrating mental and physical health interventions are essential strategies for enhancing the life satisfaction of the elderly with multimorbidity, which is important for achieving the goal of successful ageing.

References

Arokiasamy, P., Uttamacharya, U., Jain, K., Biritwum, R. B., Yawson, A. E., Wu, F., Guo, Y., Maximova, T., Espinoza, B. M., Salinas Rodríguez, A., Afshar, S., Pati, S., Ice, G., Banerjee, S., Liebert, M. A., Snodgrass, J. J., Naidoo, N., Chatterji, S., & Kowal, P. (2015). 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*, *13*(1), 178. https://doi.org/10.1186/s12916-015-0402-8

Bai, X., Yang, S., & Knapp, M. (2018). Sources and directions of social support and life satisfaction among solitary Chinese older adults in Hong Kong: The mediating role of sense of loneliness. *Clinical Interventions in Aging*, *Volume 13*, 63–71. https://doi.org/10.2147/CIA.S148334

Banjare, P., Dwivedi, R., & Pradhan, J. (2015). Factors associated with the life satisfaction amongst the rural elderly in Odisha, India. *Health and Quality of Life Outcomes*, *13*(1), 201. https://doi.org/10.1186/s12955-015-0398-y

Barik, M., Panda, S. N., Tripathy, S. S., Sinha, A., Ghosal, S., Acharya, A. S., Kanungo, S., & Pati, S. (2022). Is multimorbidity associated with higher risk of falls among older adults in India? *BMC Geriatrics*, *22*(1), 486. https://doi.org/10.1186/s12877-022-03158-5

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dumith, S. C., Leite, J. S., Fernandes, S. S., Sanchez, É. F., & Demenech, L. M. (2021). Social determinants of quality of life in a developing country: Evidence from a Brazilian sample. *Journal of Public Health*, 1–8.

Eckermann, E. (2012). The Quality of Life of Adults. In K. C. Land, A. C. Michalos, & M. J. Sirgy (Eds.), *Handbook of Social Indicators and Quality of Life Research* (pp. 373–380). Springer Netherlands. https://doi.org/10.1007/978-94-007-2421-1_17

Efklides, A., Kalaitzidou, M., & Chankin, G. (2003). Subjective quality of life in old age in Greece: The effect of demographic factors, emotional state and adaptation to aging. *European Psychologist*, *8*(3), 178.

Eshkoor, S. A., Hamid, T. A., Mun, C. Y., & Shahar, S. (2015). AN INVESTIGATION ON PREDICTORS OF LIFE SATISFACTION AMONG THE ELDERLY. *IJASOS-International E-Journal of Advances in Social Sciences*, *1*(2), 207. https://doi.org/10.18769/ijasos.86859

Foong, H. F., Hamid, T. A., Ibrahim, R., & Haron, S. A. (2020). The association between religious orientation and life satisfaction in older adults living with morbidity and multimorbidity: A gender perspective in Malaysia. *Psychogeriatrics*, *20*(6), 891–899. https://doi.org/10.1111/psyg.12614

García, R. F.-B., Cassinello, M. D. Z., Bravo, D. L., Martinez, A. M., Nicolas, J. D., Lopez, P. M., & Moral, R. S. (2011). Successful ageing: Criteria and predictors. *Psychology in Spain*, *15*(1), 94–101.

Han, C.-K., & Hong, S.-I. (2011). Assets and Life Satisfaction Patterns Among Korean Older Adults: Latent Class Analysis. *Social Indicators Research*, *100*(2), 225–240. https://doi.org/10.1007/s11205-010-9613-8

Khan, Mohd. R., Malik, M. A., Akhtar, S. N., Yadav, S., & Patel, R. (2022). Multimorbidity and its associated risk factors among older adults in India. *BMC Public Health*, *22*(1), 746. https://doi.org/10.1186/s12889-022-13181-1

Kim, J., Lee, M., & Dan, H. (2021). Gender Differences in Factors Affecting Life Satisfaction of the Elderly with Multimorbidity in Korea. *Nursing Reports*, *11*(1), 54–63. https://doi.org/10.3390/nursrep11010006

Kolosnitsyna, M., Khorkina, N., & Dorzhiev, H. (2017). Determinants of life satisfaction in older Russians. *Ageing International*, *42*, 354–373.

Rööts–Ausmees, L., & Realo, A. (2015). The Association between Life Satisfaction and Self–Reported Health Status in Europe. *European Journal of Personality*, *29*(6), 647–657. https://doi.org/10.1002/per.2037

Löckenhoff, C. E., & Carstensen, L. L. (2004). Socioemotional Selectivity Theory, Aging, and Health: The Increasingly Delicate Balance Between Regulating Emotions and Making Tough Choices. *Journal of Personality*, *72*(6), 1395–1424. https://doi.org/10.1111/j.1467-6494.2004.00301.x

Methasari, S., & Krisnatuti, D. (2018). Coping Strategy, Religiosity, and Chronic Elderly's Life Satisfaction. *Journal of Family Sciences*, *3*(2), Article 2. https://doi.org/10.29244/jfs.3.2.42-54

Mustafa, A. (2022). Examining correlates of life satisfaction among Indian older adults using household fixed-effect approach. *Discover Social Science and Health*, *2*(1), 25. https://doi.org/10.1007/s44155-022-00028-8

Ngoo, Y. T., Tey, N. P., & Tan, E. C. (2015). Determinants of life satisfaction in Asia. *Social Indicators Research*, *124*, 141–156.

Papi, S., & Cheraghi, M. (2021). Multiple factors associated with life satisfaction in older adults. *Przegląd Menopauzalny = Menopause Review*, *20*(2), 65–71. https://doi.org/10.5114/pm.2021.107025

Rajabi Gilan, N., Khezeli, M., & Zardoshtian, S. (2021). The effect of self-rated health, subjective socioeconomic status, social capital, and physical activity on life satisfaction: A cross-sectional study in urban western Iran. *BMC Public Health*, *21*(1), 233. https://doi.org/10.1186/s12889-021-10261-6

Rana, G. S., Shukla, A., Mustafa, A., Bramhankar, M., Rai, B., Pandey, M., & Mishra, N. L. (2022). Association of multi-morbidity, social participation, functional and mental health with the self-rated health of middle-aged and older adults in India: A study based on LASI wave-1. *BMC Geriatrics*, *22*(1), 675. https://doi.org/10.1186/s12877-022-03349-0

United Nations, The World Population Prospects: The 2015 Revision. Department of Economic and Social Affairs, Population Division. New York: United Nations; 2015.

Appendix

Table 1: Socio-demographic and health profile of the elderly with multimorbidity in India (N=7582)

Background Characteristics	Number of Participants	Percentage (%)
Age		
60-69	4375	57.7
70-79	2450	32.31
80+	757	9.99
Sex		
Male	3435	45.3
Female	4147	54.7
Residence		
Rural	3884	51.22
Urban	3698	48.78
Educational status		
No education	3157	41.64
Primary or less	2072	27.33
Middle	623	8.22
Secondary	894	11.2
Higher	881	11.61
Marital Status		
Currently married	4775	62.98
Widowed	2620	34.56
Others	187	2.46

Religion		
Hindu	5349	70.55
Muslim	1140	15.04
Others	1093	14.41
Caste		
Scheduled Caste	1013	13.36
Scheduled Tribe	722	9.52
OBC	2998	9.54
Others	2849	37.58
MPCE Quantile		
Poorest	1065	14.05
Poorer	1305	17.21
Middle	1502	19.81
Richer	1715	22.62
Richest	1995	26.31
Living Arrangement		
Living alone	354	4.67
Living with family	6829	90.07
Living with others	399	5.26
Working Status		
Currently Working	1286	16.96
Not Working	6296	83.03
Social participation		
Low	3152	41.58
Medium	2241	29.56
High	2189	28.86
Use of Alcohol		
Yes	1097	14.47
No	6485	85.53
Use of Tobacco		
Yes	2391	31.54
No	5191	68.46
Physical activity		
Yes	953	12.57
No	6629	87.43
Self-rated Health		
Good	2961	39.05
Fair	2763	36.44
Poor	1858	24.51
Depression		
Yes	676	8.92
No	6906	91.08
Total	**7582**	**100**

Table 2: Mean Life Satisfaction Score of the elderly with multimorbidity by background characteristics in India (N=7582)

Background Characteristics	Life Satisfaction Mean (SD)	p Value
Age		0.856
60-69	24.08 (7.90)	
70-79	23.71 (7.76)	
80+	23.53 (7.46)	
Sex		0.749
Male	23.85 (7.93)	
Female	23.95 (7.72)	
Residence		< 0.001
Rural	22.95 (7.86)	
Urban	25.13(7.56)	
Educational status		< 0.001
No education	22.21 (7.86)	
Primary or less	23.76 (7.90)	
Middle	26.38 (7.32)	
Secondary	26.50 (6.59)	
Higher	26.42 (6.94)	
Marital Status		< 0.001
Currently married	24.14 (7.72)	
Widowed	23.65 (7.87)	
Others	21.21 (8.99)	
Religion		< 0.001
Hindu	24.02 (7.79)	
Muslim	23.59 (7.39)	
Others	23.24 (8.59)	
Caste		< 0.001
Scheduled Caste	22.01 (7.65)	
Scheduled Tribe	23.55 (7.63)	
OBC	23.82 (8.13)	
Others	24.92 (7.23)	
MPCE Quantile		< 0.001
Poorest	22.09 (7.80)	
Poorer	23.26 (7.81)	
Middle	23.18 (7.60)	
Richer	24.93 (7.60)	
Richest	25.13 (7.51)	
Living Arrangement		< 0.001
Living alone	20.57 (8.21)	
Living with family	24.21 (7.69)	
Living with others	21.83 (8.38)	

Working Status		0.308
Currently Working	23.46 (7.62)	
Not Working	24.00 (7.85)	
Social participation		< 0.001
Low	22.75 (8.29)	
Medium	24.40 (7.30)	
High	25.10 (7.41)	
Use of Alcohol		0.003
Yes	23.35 (7.96)	
No	23.98 (7.78)	
Use of Tobacco		< 0.001
Yes	22.85 (7.63)	
No	24.4 (7.84)	
Physical activity		< 0.001
Yes	24.46 (7.63)	
No	23.82 (7.83)	
Self-rated Health		< 0.001
Good	25.04 (7.29)	
Fair	24.42 (7.76)	
Poor	21.48 (8.09)	
Depression		< 0.001
Yes	20.07 (9.03)	
No	24.37 (7.51)	

Table 3: State-wise distribution of mean life satisfaction of the elderly with multi-morbidity in India

States and Union Territories	Mean Life Satisfaction
Gujarat	29.6
Dadra & Nagar Haveli	28.4
Chandigarh	27.34
Himachal Pradesh	27.26
Maharashtra	26.39
Arunachal Pradesh	26.18
Punjab	26.09
Uttarakhand	25.87
Sikkim	25.67
Meghalaya	25.09
Nagaland	25.06
Tripura	25.05
Lakshadweep	24.72
Mizoram	24.66
Manipur	24.64
Bihar	24.57
Karnataka	24.5
Goa	24.5

Tamil Nadu	24.18
Andaman & Nicobar Islands	24.18
Assam	24.17
Jharkhand	24.15
Haryana	23.95
NCT Of Delhi	23.63
Kerala	23.55
Madhya Pradesh	23.28
Puducherry	23.21
Uttar Pradesh	22.99
Odisha	22.81
Chhattisgarh	22.14
West Bengal	21.99
Jammu & Kashmir	21.79
Rajasthan	21.66
Andhra Pradesh	21.34
Telangana	20.26
India	**23.9**

Table 4: Results of multivariate linear regression analysis of factors affecting life satisfaction among Indian older adults with multi-morbidity

Background Characteristics	β Coef.	P Value	Conf. Int. (95%)
Age			
60-69®			
70-79	0.389*	0.035	0.027 - 0.751
80+	0.842**	0.004	0.269 – 1.428
Sex			
Male®			
Female	0.650**	0.002	0.206 - 1.044
Residence			
Rural®			
Urban	0.317	0.076	-0.033 - 0.666
Educational status			
No education®			
Primary or less	1.209***	0.000	0.797 - 1.622
Middle	1.781***	0.000	1.142 - 2.419
Secondary	2.364***	0.000	1.771 - 2.957
Higher	2.842***	0.000	2.215 - 3.468
Marital Status			
Widowed®			
Currently Married	0.484*	0.022	0.897 - 0.071
Others	-1.181	0.176	-2.290 - 0.073
Religion			
Hindu®			

Muslim	-0.148	0.543	-0.628 - 0.330
Others	0.437	0.078	0.049 – 0.924
Caste			
SC®			
ST	1.048**	0.003	0.348 - 1.748
OBC	0.368	0.161	-0.147 - 0.884
None of the above	0.988***	0.000	0.453 - 1.523
MPCE Quantile			
Poorest®			
Poorer	0.658*	0.024	0.086 - 1.230
Middle	0.507	0.076	-0.052 - 1.067
Richer	1.053***	0.000	0.501 - 1.604
Richest	1.145***	0.000	0.593 - 1.698
Living Arrangement			
Living alone®			
Living with family	1.621***	0.000	0.823 - 2.420
Living with others	1.397**	0.007	0.373 - 2.420
Working Status			
Not working®			
Currently working	-0.331	0.161	-0.793 - 0.131
Social Participation			
Low			
Medium	0.211	0.287	-0.177 – 0.600
High	0.721**	0.001	0.312 – 1.129
Use of Alcohol			
No®			
Yes	-0.296	0.447	- 0.316 - 0.718
Use of Tobacco			
No®			
Yes	-0.296	0.136	-0.093 - 0.687
Physical activity			
No®			
Yes	0.708**	0.006	0.205 – 1.211
Self-rated Health			
Poor®			
Good	2.884***	0.000	2.455- 3.314
Fair	1.767***	0.000	1.346 - 2.189
Depression			
No®			
yes	-2.648***	0.000	-3.217 - 2.080
_cons	15.4563***	0.000	14.158 - 16.753

*p<0.05, **p<0.01, ***p<0.001   ® = Reference category