Gender inequalities in prevalence, pattern and predictors of multimorbidity among geriatric population in rural West Bengal

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ABSTRACT

Context: Multimorbidity is considered as a priority for global health research. It is defined as the coexistence of two or more chronic health conditions in an individual. It is increasingly being recognized as a major concern for primary care physicians due to its huge impact on individual, family, and societal level. Aim: The aim of this study was to find the quantum of gender-related inequalities and determinants of multimorbidity among the elderly people in a rural part of West Bengal. Materials and Methods: This is a cross-sectional study carried out among 246 elderly people (60 years and above) in a community setting from Oct 2017 to Sep 2018. Logistic regression analysis was done to find out the predictors of multimorbidity. Data were analyzed using the SPSS software (version 16.0, Chicago, SPSS Inc.). Results: Approximately 82% of the study subjects were suffering from multi-morbidity with a significant difference between males (80.9%) and females (88.5%). In binary logistics, people of both the genders aged >70 years, who had less than primary level education, had more than three children, whose source of income was from their children (sons/daughters), were dependent on others for daily routine were at high risk of being multimorbid; whereas depression was a significant predictor of multimorbidity in females and not in males. In multivariable analysis, age remained the only significant predictor for both the gender and for females; depression remained significant after adjusting with significant variables in binary logistics. Conclusion: Morbidity screening at each visit, individual as well as family counseling and lifestyle modifications help to cope with the rising burden of multimorbidity at the primary care level. More insight into the epidemiology of multi-morbidity is necessary to take steps to prevent it, lower its burden and align health-care services as per needs.

Keywords: Gender inequalities, geriatrics, multimorbidity

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Introduction

The remarkable advances in public health and medicine have led to a significant increase in life expectancy over the years and in turn made more people live long enough to suffer the age-related loss of function and disease. Life expectancy at birth in India is notably longer for females (69.9 years) compared to males (67.1 years).
to males (66.9 years). Females are more likely to visit the hospital or health care provider, but less likely to die earlier than males. Notably, chronic diseases which are most prevalent by gender explain this male-female health-survival paradox as females are more likely to experience pain, reproductive cancers, and depression, while males are more likely to experience cardiovascular disease and diabetes. Multiple factors such as biological, behavioral, economic and socio-cultural factors influence Gender-based inequalities in health.

Multimorbidity is defined as the coexistence of two or more chronic health conditions in an individual and is increasingly being recognized as a major concern for primary care physicians due to its huge impact on individual, family, and societal level. Multimorbidity increases the risk of functional limitation, premature deaths, hospitalization, depression, polypharmacy, worsens the quality of life, and imposes a substantial economic burden on patients and over health systems. Multimorbid patients have a high treatment burden in terms of understanding and self-managing the conditions, attending multiple appointments, and managing complex drug regimens and they consider this as an “endless struggle”. A study carried out in a developed country found that approximately 65% of those aged more than 65 years and almost 82% of those aged 85 years or more had two or more chronic conditions. A systematic review of various studies concluded that women had a higher prevalence of multimorbidity compared with men.

Worldwide, health system was designed around single disease or body system, so taking care of multimorbidity is a key challenge for primary care physicians. This is likely to result in many missed opportunities to provide care for co-existing conditions that may not have been the focus of patient or specialist consultation. In a resource-limited country like India, the people from low-income groups and rural parts face difficulty in accessing the healthcare setting repeatedly for each condition and growing health costs make it even difficult to avail care. With this backdrop, a community-based study in rural geriatric population has been conducted to find out the gender inequalities in burden, pattern and determinants of multimorbidity to scale up the effective strategies for the early identification of diseases and the prevention of complications.

Materials and Methods

As this study is a part of the thesis, the socio-demographic features of respondents, the methodology and few independent variables to some extent are similar to the study with different outcome titled “Assessment of poor functional status and its predictors among the elderly in a rural area of West Bengal”. This is a cross-sectional study carried out among the elderly people (60 years and above) in a community setting from Oct 2017 to Sep 2018 in a rural part of West Bengal. The study area compromises of 64 villages among which only 6 villages were randomly chosen for study purpose. As there were no studies on prevalence of multimorbidity from rural West Bengal, so a pilot study was conducted to find the prevalence, which comes out to be 41%. Sample size was calculated using the formula: \[ N = \left( Z_{\alpha/2} \right)^2 \frac{PQ}{L^2} \] where \( Z_{\alpha/2} \) is the standard normal deviate at 95% confidence level; \( P \) - 15% relative error; \( P \) - Prevalence; \( L \) - 15% relative error. Probability proportional to size (PPS) sampling was used to select the participants from each village. People who were critically ill and people who were not willing to participate were excluded from the study. If there was no response or consent could not be obtained from the study participant in the sampled household, the next household was considered for data collection. Furthermore, if one household had two or more elderly persons, then a simple random sampling was applied to select the study participant to be included.

A pre-designed and pre-tested structured schedule was used to collect the data from each participant through face-to-face interviews for the following:

Outcome variable

The outcome of the study is the presence of multimorbidity (≥2 chronic illnesses), data for which was collected from the subjects who were suffering from the illnesses for the duration of 3 months and the ascertainment of diseases was based on self-reports.

Independent variables

The elder people, especially females who belong to lower social-economic status and being illiterate were more likely to be neglected in various aspects such as healthcare utilization, nutrition and optimal care which make them prone to chronic illnesses. Furthermore, cultural and religious factors play a significant role in taking care of the elderly. Functional dependency and depression push them more into morbidity.

1. Socio-demographic characteristics such as age, sex, religion, caste, marital status, years of education, employment status, number of children (sons/daughters), type of family.
2. Functional status assessed in terms of Activities of daily living (ADL) and instrumental activities of daily living (IADL) which refers to people’s daily self-care activities and activities that let an individual live independently in a community respectively adapted from Katz index questionnaire and Lawton IADL Scale. Cronbach’s alpha for the Bengali version of ADL and IADL questionnaire was 0.91 and 0.87 respectively.
3. Depression: Assessed using questions used to elicit depressive symptoms in a study by Tamakoshi and Ohno. Cronbach’s alpha for the Bengali version was 0.73.

First, the face and content validity of the instrument was checked then the tool was translated into the local language (Bengali) maintaining semantic equivalence. Pretesting of the questionnaire was done and the tool was revised based on the responses obtained. Ethical approval from the Institutional Ethical Review Board was obtained.
Committee has been obtained and informed written consent was taken from all patients in the study. The study was conducted as per the Declaration of Helsinki for ethical consideration.

**Data analysis**

Data were analyzed using the statistical package of social science software version 16.0 (IBM, SPSS Inc., Chicago, USA). Descriptive statistics were calculated and the Chi-square test was used to find out whether there was any significant difference between male and female respondents in terms of multimorbidity. Univariate and multivariable logistic regression was performed to identify the factors associated with multimorbidity at a significant level \( P < 0.05 \).

**Result**

The study subjects’ age ranged from 60 to 102 with mean (SD) age: 71.8 (±9.85) years. Four respondents were above the age of 100 years and all of them were females. About 42.3% of subjects were females and 57.7% of subjects were males. Two third (67.4%) of the study subjects were living with their married children. Around half (48.7%) of the study participants belonged to class IV socioeconomic status and about one-third (34.1%) of subjects were earning money. Among females, only 4.8% were earning. Around one-third (32.5%) of subjects were dependent (i.e. no assistance) on others for doing basic activities of daily living. 19 (7.7%) participants were highly dependent, i.e., they needed assistance to pursue all the six basic daily ADL, among which most, 18 (94.8%) participants were females. About 59.3% were dependent for IADL among which nearly three fourth (67%) were females.

**Prevalence of multimorbidity**

Around 82% of the study subjects were suffering from two or more chronic illnesses (Multi-morbidity) whereas, only 4.5% of the study subjects were not suffering from any chronic illnesses. The prevalence of multimorbidity in males (115/142) and females (92/142) were 80.9% and 88.5% respectively. There is a significant difference between males and females in terms of multimorbidity. \( \chi^2 = 29.95; \text{d.f.} = 1; \ P = <0.05 \) [Table 1].

**Pattern of multimorbidity**

Eye problems (65.9%) were the most common illness followed by the loco-motor disorders and urinary incontinence. [Table 2] The most common pattern of morbidities among males were eye problems with respiratory illnesses (10.6%) followed by eye problems with arthritis and low back ache. In female’s arthritis and low back ache with eye problems, gastro intestinal illnesses was the most common morbidity pattern (6%).

**Predictors of multimorbidity segregated by gender**

In bivariate analysis, people of both the genders aged >70 years, who had less than primary level education, had more than three children, whose source of income was from their children (sons/daughters), dependent on others for daily routine were at high risk of being multimorbid; whereas depression was a significant predictor of multimorbidity in females and not in males. In multivariable analysis, age remained the only significant predictor for both the gender and for females; depression remained significant after adjusting with other variables in bivariate analysis. As the Hosmer–Lemeshow statistic (goodness of fit test) is non-significant, the model is fit to explain the factors determining multimorbidity. The age factor accounts for 23% (Nagelkerke \( R^2 = 0.23 \)) variability in determining multimorbidity among males whereas, in females, age and depression explain about 42% variation in determining multimorbidity [Table 3].

**Discussion**

Females usually neglect their health in taking care of their family members and are more likely to be unemployed, widowed, less engaged in physical activity in old age and have relatively higher tendency to share their conditions in self-reports than older men. Female used to suffer from illnesses and disabilities which are not life-threatening and male suffer from more serious and often deadly conditions. There is evidence that women use more healthcare facilities, particularly public-funded healthcare, compared with men. So, gender remains the main factor affecting the occurrence and outcome of multimorbidity.[14] This study tried to find the quantum of gender-related inequalities and determinants of multimorbidity among the geriatric population.

| Number of chronic illnesses | Male No. (%) | Female No. (%) | Total No. (%) | Mean±SD | Chi square test |
|-----------------------------|--------------|----------------|---------------|---------|----------------|
| 0                           | 9 (81.8)     | 2 (18.2)       | 11 (4.5)      |         |                |
| 1                           | 18 (64.2)    | 10 (35.8)      | 28 (11.4)     |         | \( \chi^2=29.95 \) |
| 2                           | 46 (88.4)    | 6 (11.6)       | 52 (21.1)     |         |                |
| 3                           | 32 (66.6)    | 16 (33.4)      | 48 (19.5)     |         |                |
| 4                           | 28 (57.1)    | 21 (42.9)      | 49 (19.9)     |         |                |
| 5                           | 5 (17.2)     | 24 (82.8)      | 29 (11.8)     |         |                |
| 6                           | 3 (20)       | 12 (80)        | 15 (6.1)      |         |                |
| 7                           | -            | 11 (100)       | 11 (4.5)      |         |                |
| 8                           | -            | 2 (100)        | 2 (0.8)       |         |                |
| 9                           | 1 (100)      |                | 1 (0.4)       |         |                |

Table 1: Distribution of study subjects according to the frequency of self-reported chronic illnesses (n=246)
as most of the studies on the morbidity of elderly concentrate on individual illnesses.

Prevalence of multimorbidity

Most of the studies on multimorbidity among elderly populations were done in developed countries and data from developing countries was very limited. The present study found the prevalence of multimorbidity to be 82.1% which is higher than studies done in various parts of India which observed prevalence ranging from 45-65%. In developed nations like European (61-80%), Japan (62.8%), the prevalence is found to be lower than the present study whereas in Brazil (93.4%) and China (90%), it is found to be much higher than present study. This wide variation in the prevalence is due to the difference in the criteria or definitions used to measure multimorbidity and due to variations in demographic and socio-economic conditions which reflects in health care system between developed and developing countries. A systematic review in South Asia showed the number of health conditions analyzed per study varied from 7 to 22, with prevalence of multimorbidity from 4.5% to 83%.

A cross sectional study in 17 European countries found 28.2%

### Table 2: Distribution of study subjects according to their self-reported chronic illnesses (n=246)

| Self-reported chronic illnesses | Male No. (%) | Male No. (%) | Total No. (%) |
|-------------------------------|--------------|--------------|---------------|
| Eye problems (cataract/loss of vision) | 88 (61.9) | 54 (38.1) | 162 (65.9) |
| Hearing loss | 7 (33.4) | 14 (66.6) | 21 (8.5) |
| Heart diseases | 11 (61.1) | 7 (38.9) | 18 (7.3) |
| Respiratory diseases | 36 (48) | 39 (52) | 75 (30.5) |
| Cancer | - | 1 (100) | 1 (0.4) |
| Diabetes Mellitus | 16 (59.3) | 11 (40.7) | 27 (11) |
| Hypertension | 21 (33.8) | 41 (66.2) | 62 (25.2) |
| Arthritis/Low back ache | 72 (46.1) | 84 (53.9) | 156 (63.4) |
| Gastro-intestinal disorders | 53 (43.3) | 69 (56.7) | 122 (49.6) |
| Urinary disorders | 55 (41.6) | 77 (58.4) | 132 (53.7) |
| Neurological problems | 11 (33.4) | 22 (66.6) | 33 (13.4) |

### Table 3: Gender wise univariate and multivariable logistic regression of factors associated with multi-morbidity (n=246)

| Variables | Male OR (95% confidence interval) | Male AOR (95% confidence interval) | Female OR (95% confidence interval) | Female AOR (95% confidence interval) |
|-----------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Age       |                                  |                                   |                                   |                                   |
| 60-70     | 1                                | 1                                 | 1                                 | 1                                 |
| >70       | 5.3 (2.4-11.4)***                | 4 (1.6-10.2)**                    | 14.1 (3-65)                      | 11.5 (1.7-75.9)**                  |
| Caste     |                                  |                                   |                                   |                                   |
| General   | 1                                | 1                                 | 1                                 | 1                                 |
| OBC       | 1.4 (0.7-3.1)                    | 2.6 (0.8-8)                       |                                   |                                   |
| SC        | 0.8 (0.3-2)                      | 4.4 (0.5-37.9)                    |                                   |                                   |
| Marital status |                      |                                   |                                   |                                   |
| Currently married | 1                         |                                   | 2.1 (0.7-6.2)                     |                                   |
| Widow/separated | 1.1 (0.5-2.4) | 2.5 (0.8-8)                       |                                   |                                   |
| Type of family |                                  |                                   |                                   |                                   |
| Nuclear   | 1.7 (0.8-3.6)                    |                                   |                                   |                                   |
| Joint     | 1.7 (0.8-3.6)                    | 2.5 (0.8-8)                       |                                   |                                   |
| Educational status |      |                                   |                                   |                                   |
| Primary and Above | 2.4 (1.1-5.3)* | 2.2 (0.9-5.5) | 3.5 (1.2-10.1)** | 0.5 (0.1-3.2) |
| Number of children | 2.5 (1.1-5.9)* | 1.2 (0.4-3.3) | 5.3 (1.7-16)** | 3.3 (0.8-13.5) |
| Source of income |                                  |                                   |                                   |                                   |
| Self income | 1                               | 1                                 |                                   |                                   |
| Son/daughter | 2.2 (1.1-4.3)* | 1.2 (0.5-2.9) | 3.7 (1.1-13.2)* | 0.3 (0.1-2.4) |
| Activities of daily living |                                  |                                   |                                   |                                   |
| Independent | 4.4 (1.7-11.1)** | 1.6 (0.4-5.6) | 6.3 (1.7-23.4)** | 0.9 (0.1-5.9) |
| Instrumental activities of daily living |                                  |                                   |                                   |                                   |
| Independent | 2.3 (1.1-4.6)* | 0.9 (0.3-2.2) | 5.9 (2-17.4)** | 3.8 (0.7-19.1) |
| Depression |                                  |                                   |                                   |                                   |
| ≤2 symptoms | 1                               | 1                                 |                                   |                                   |
| >2 symptoms | 2 (0.9-4.4)                      | 5.5 (1.8-16.2)**                  | 5.3 (1.1-24.2)*                   |                                   |

Note: *P<0.05, **P<0.01, ***P<0.001
among men and 34.5% among women which is very less than the present study which reflects the health care system and lifestyle of developed countries.\cite{25} 

### Pattern of multimorbidity

In the present study, eye problems were the most common problem as older people were concerned more about vision followed by hypertension which is similar to other studies in India.\cite{24,28} A study in north India found that hypertension, diabetes and acid peptic disease were found to be significantly higher among females as compared to males. There was not much difference in the occurrence of other chronic diseases concerning gender.\cite{26} In contrast, a study in South India found diseases of Musculoskeletal System (39%) to be most commonly seen whereas other studies in Chhattisgarh and Delhi showed GIT disorders (82.6%), it may be due to the difference in the questionnaire.\cite{27,28} A project (LASI) done in four states of India show that hypertension, arthritis and diabetes as the common chronic diseases.\cite{29} A study from European countries found the most common health condition as hypertension which is similar to the present study.\cite{30,31}

### Predictors of multimorbidity

Very few studies have been conducted regarding the predictors of multimorbidity. In this study, the study population had been stratified by gender and analysis was done to found out the factors responsible for multimorbidity in each group. Age is the most common and important predictor of multimorbidity in both the genders as this may be due to the self-perceived health status of elderly especially after 70+ years and this pattern may be due to accumulation of chronic health conditions during the ageing process.\cite{16‑24} As the age increases, there will be a limitation in functioning, increased predisposition for chronic illnesses and not getting timely access to treatment may make it even worse and negatively influence the perceptions regarding their self-health.

As 90% of elder people aged more than 75 years were residing in a joint family and morbidity increases with age which indirectly makes the joint family a predictor of multimorbidity.\cite{31‑33} Multimorbidity is also more common in disadvantaged groups; those who are less educated and of low socioeconomic status and in early years.\cite{13,16,28} With the progress of epidemiological transition in India, the association between socioeconomic status and chronic diseases prevalence has reversed from positive to negative.\cite{34} Socioeconomic status and caste can affect the people in utilizing health services, which render them more prone to chronic illnesses. Whereas a study in rural Orissa showed education has no association with multimorbidity and another study among primary care patients found that people with higher education and high income are associated with significantly higher odds of multimorbidity this may be due to their health-seeking behavior.\cite{22} People who were living alone and functionally limited are more prone to be multimorbid because of their difficulty in accessing the care, their dependency on others to take them to hospital and inability to do physical activity. Depression is found to have long-term negative effects on health, leading to an increase in disease susceptibility and increased risk of mortality.\cite{22}

In multivariable logistic regression analysis, the present study showed age as the significant predictor of multiple chronic conditions among both the genders, whereas in females, depression remained a significant predictor. According to a meta-analysis done in 2011 found that prevalence of multimorbidity in elderly people ranges from 55 to 98% and older age, female gender, and low socioeconomic status are factors associated with multimorbidity in cross-sectional studies, which is been confirmed by longitudinal studies as well.\cite{9} The main area of concern among the elderly is to be free from chronic illnesses, which can, in turn, have a significant impact on their economic security, level of independence and social interaction. **Strength:** Most of the studies on elderly people on morbidity profile were done on hospitals, where only the extremes of cases arrive. The present study tried to find out the spectrum of morbidities. In a developing country like India where gender determines the physical and mental quality of life, a study which throws light over the gender based inequalities is rare.

### Limitations

The burden of chronic illnesses was recorded as self-reported. The identification of any such predictors of multimorbidity and the assessment of the likelihood of causality requires data from prospective large scale studies.

### Conclusions

The present study found that both the genders of old age were experiencing multimorbidity on a large scale [male = 80.9%; female = 88.5%] and it also highlights the health inequalities among gender. More emphasis should be focused on introducing multimorbidity screening at each visit for geriatric population, counseling and lifestyle modification so as to cope with the rising burden of multimorbidity at the primary care level. To address gender inequality, family level counseling and awareness in the community regarding health needs of elderly women who are a neglected community within the society should be encouraged.

In 2018, GOI launched Ayushman Bharat program with a component of health and wellness centers to provide comprehensive healthcare including geriatric, palliative, mental health services and population-based screening for NCDs which will eventually reduce the multimorbidity burden. These efforts are also aligned with the SDGs, most notably SDG-3 (good health and wellbeing) and SDG-5 (gender equality). There is a need to bring about innovations in our primary health care services so that it can address the health needs of the elderly specially women.

### Summary

This is a community-based study in rural geriatric population been conducted to find out the gender inequalities in burden,
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