Gender Differentials in the Impact of Multi-Morbidity on Self Rated Health in Rural West Bengal in India

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Abstract

Objective: *Self Rated Health (SRH) has widely been used as an indicator of overall health in a population. Given the rising burden of chronic conditions even in the rural region of India, the present study explores the gender differentials in the impact of multi-morbidity on SRH in the Sundarbans of West Bengal.*

Methods: *A cross sectional study was done in the 19 blocks of the Sundarbans in West Bengal, India. A gender segregated analysis was done to understand the effect of multi-morbidity on SRH while controlling for socio-demographic and lifestyle behaviors. Partial Proportional Odds Regression was used.*

Results: *The odds of a poor rating on SRH was 2.61 (C.I 1.44-4.72) for multi-morbid cases as compared to those who had no disease and the odds increased with age among men. The odds ratio of poor rating among families with income deficits, compared to those without any deficits was 3.04(C.I 1.57-5.89). Age had no association with SRH rating, but, it showed a positive association with multi-morbidity and education among women. Poor rating on SRH was negatively associated with employment status and marital status.*

Conclusion: *SRH is a widely used indicator for mortality. With increasing burden of chronic conditions, specifically multi-morbidities, there is a need for responsive, gender sensitive strategies for healthcare in an ageing, rural population.*

Keywords – *Gender, Multi-morbidity, Sundarbans, Self rated Health*

I. Introduction

Chronic diseases are a leading cause of mortality across the globe. It is estimated that by 2020, almost 67% of the deaths in India will be due to Non-Communicable diseases(NCD) [1]. Premature mortality attributable to non-communicable diseases is estimated to be 48 percent in low and middle income countries like India[2]. An often forgotten aspect of NCDs is - Multi-morbidity or Multiple Chronic conditions. It is defined as two or more diseases occurring in an individual at the same point in time and is highly prevalent among the elderly[3]. Frailty, vulnerability and functional limitations induced by advancing age are further exacerbated by multiple disease conditions and contribute to mortality and health related quality of life[4]. Self rated health (SRH) is a widely used population metric for mortality risk and health related quality of life [5]. It is a single item measure of perceived health status among individuals that has been used extensively as a predictor of mortality, objective health status and population at health risk [6,7]. Studies exploring the association of SRH with mortality risk have found that mortality risk due to chronic diseases like cancer, respiratory illness, diabetes, acute myocardial infarction etc, showed a strong association with SRH[8]. Research in developed country settings have shown that SRH is positively associated with multiple chronic conditions[9].

Perceived health status is also influenced by several soico-economic and environmental variables. Studies on self rated health have shown an association with gender, economic status and morbidities[10]. Socio-economic status has been found to be a strong determinant of SRH with poorer groups reporting worse ratings on health [11]. Women have been found to report poorer ratings on health, inspite of having a higher life expectancy than men [12,13]. The present manuscript focuses on undertanding the gender differences in the implications of multi-morbidity on SRH. With geriatric population in India rising to account for 10 percent of the total population in the coming year and an increasing burden of chronic conditions, the negative impact of chronic conditions, and specifically multiple chronic conditions, interms of well being and functionality requires attention. In this paper we present evidence on the implications of multiple chronic conditions on SRH in the remote rural islands of the Sundarbans of West Bengal in India.

II. Data and Methods

1.1 Study Area

Sundarbans, a vast spread of forest islands in West Bengal. They are spread across two districts of South and North 24 Paraganas, located towards the southern end of the state. They are an epitome of poverty

and vulnerability due to climate and geographical challenges[14].Akin to many rural regions of the country, quality health care is often inaccessible. The prevalence of chronic diseases like arthritis, asthma, cataract, angina, hypertension and Blood Sugar is considerably high[15].

1.2 Study Design

A household survey was done in 2009 in all the 19 blocks that constitute the Sundarbans in West Bengal, India. A two stage random sampling procedure was used. A total of 57 Primary Sampling Units (PSU) were selected in the first stage with 3 PSUs being randomly selected from each block. Second stage included selection of 1141 households from the 57 PSUs that included ten percent over sampling to adjust for non-response. One respondent of the age 40 years or older was randomly selected from the sampled households and interviewed for information on Non-communicable diseases. A total of 831 households had at least one member above the age of 40 that were interviewed of which results from 815 cases have been presented in the present manuscript. Informed consent was sought from all respondents for participating in the survey.

Self rated Health - Respondents were asked 'In general, how would you rate your health today?' on a 5 point likert scale and responses were coded as '1=Good/Very Good', '2=Moderate' and '3=Bad/Very Bad' because of skewed responses. We defined multiple morbidity as the presence of two or more chronic conditions in a person at the time of survey[16]. We have defined the presence of a chronic condition as 'self reported diagnosis or from symptoms highly suggestive of such a condition'. Respondents were asked if they were diagnosed with Angina, Arthritis, Asthma, hypertension/High Blood Pressure, Diabetes/High Blood Sugar and Cataract specifically, from any health provider. Only these diseases were considered given their burden in the Indian context.

A clinical algorithm was used for categorizing respondents as highly probable cases based on the criteria outlined by Levesque, Mukherjee & Grimard et.al using symptoms for chronic conditions[17]. Respondents who gave a self reported diagnosis of a clinical condition and/or responded yes to the key symptoms characteristic of the disease were classified as highly probable cases.There are no typical symptoms that characterize hypertension and diabetes; hence self reported diagnosis was used as a criterion. A clinical algorithm was used to improve the identification of cases with chronic conditions in the rural setting.

Socio-demographic Variables - We gathered information on background characteristics including age, location, education, caste and perceived poverty. Education was classified in to three categories-'Illiterate/Literate without formal education', 'Primary Education' and 'Secondary or Higher Education'. Respondents were classified in to General, Other Backward Castes (OBC), Scheduled Caste (SC)/Scheduled Tribes castes (ST).The study area was classified in to remote and non remote zones based on the proximity of the blocks with the city. We classified respondents in to three categories for perceived poverty based on self report, 'always had deficit of income', 'had occasional deficit' and 'rare or no deficit'.

Risk Factors- Respondents were categorized for smoking exposure based on minimum pack years of exposure to smoking based on the definition provided by Lee Y-H, Shin M-H, Kweon S-S, et al[18]. We calculated minimum pack years of exposure based on the minimum number of cigarettes that the respondent has in a day and the number of years since he/she has been smoking tobacco, to approximate the pack years of exposure to smoking. Respondents were classified as consuming sufficient amount of vegetables if they had more than 5 servings a day[19]. 'Servings' was defined as the number of items with vegetables multiplied by number of meals per day. Body Mass Index (BMI) was calculated using weight and height measurements taken from respondents using a standard tape and weighing machine.

1.2 Statistical Analysis

The outcome variable under consideration is Self Rated Health among respondents above 40 years of age in the Sundarbans. We first did an exploratory analysis using STATA Version 11.0 Software. All background characteristics, risk factors and number of chronic conditions were considered as predictors of self rated health. The outcome variable of interest being ordinal in nature we chose a Partial Proportional Odds Model (PPO model) for the above set of predictors. Gender segregated analysis was done to control for the influence of gender on the outcome variable. We checked if the predictors in the final model met the proportional odds assumption through the Wald statistic.

For the purposes of illustration, predicted probabilities of Self Rated Health on the Likert scale were populated using the gender segregated estimates while adjusting for all variables. The predicted probabilities of various ratings on SRH by age were plotted for: a) Respondents with single chronic from poor households condition, b) Respondents with multiple chronic conditions from poor households and c) Respondents with single chronic condition from not so poor households and d) Respondents with multiple chronic conditions from not so poor households. All other variables in the model were held constant.

III. Results

A total of 815 respondents were included in the analysis after data cleaning of which there were 397 female and 418 male respondents. The average age of the respondents was 54.90 years. Table 1 shows the demographic composition of the study sample.

Table 1: Socio- Demographic composition of the sample

Socio-demographic factors	Total (N=815) Mean± SD
Age	54.87±10.71
BMI	20.14±3.41
Sex	
Men	51.29
Women	48.71
Caste (%)	
General	47.36
OBC	4.54
Scheduled Caste	48.10
Perceived poverty (%)	
Always deficit	40.42
Occasional Deficit	40.91
Rare or no Deficit	18.67
Education (%)	
Illiterate or Literate without formal Education	43.44
Primary	47.73
Secondary or higher	8.33
Marital Status (%)	
Married	78.17
Widowed/Separated/Unmarried	21.84
Location (%)	
Remote Sundarbans	44.05
Non-Remote Sundarbans	55.95
Occupational Groups (%)	
Employed	42.33
Unemployed	57.67
Smoking (%)	
Non smokers	57.09
Light smokers	36.14
Moderate to Heavy Smokers	6.77
Vegetable Intake (%)	
Insufficient	87.25
Sufficient	12.75
Self Rated Health (%)	
Good to Very Good	34.11
Moderate	37.30
Bad to very bad	28.59

*SD- Standard Deviation

Table 2 shows the average score on SRH against background characteristics - socio-demographic factors and lifestyle behaviors. The results show that the mean scores on SRH increase with age, perceived poverty and decrease with education.

Table 2: Mean value of self rated health against background characteristics

| Socio-demographic factors	Total (N=815) Mean± SD
Age	
40 to 49 yrs	2.36± 1.25
50 to 59yrs	2.51± 1.21
60 to 69yrs	2.79 ± 1.18
>70 yrs	3.20 ± .92
Sex	
Men	2.45 ± 1.24
Women	2.76 ± 1.17
Caste (%)	
General	2.62 ± 1.23
OBC	2.54 ± 1.21
Scheduled Caste	2.58 ± 1.21
Perceived poverty (%)	
Always deficit	2.89 ± 1.17
Occasional Deficit	2.38 ± 1.18
Rare or no Deficit	2.41 ± 1.27
Education (%)	
Illiterate or Literate without formal Education	2.69 ± 1.21
Primary	2.60 ± 1.21
Secondary or higher	2.18 ± 1.23
Marital Status (%)	
Married	2.56 ± 1.23
Widowed/Separated/Unmarried	2.73 ± 1.17
Location (%)	
Remote Sundarbans	2.56 ± 1.23
Non-Remote Sundarbans	2.63 ± 1.20
Occupational Groups (%)	
Employed	2.35 ± 1.22
Unemployed	2.94 ± 1.13
Smoking (%)	
Non smokers	2.59 ± 1.23
Light smokers	2.65 ± 1.19
Moderate to Heavy Smokers	2.30 ± 1.24
Vegetable Intake (%)	
Insufficient	2.63 ± 1.21
Sufficient	2.32 ± 1.25

*SD- Standard Deviation

Table 3 shows the results from the partial proportional odds regression. Multiple chronic conditions, age and smoking exposure were significantly associated with worse self rated health outcomes. Both men and women showed higher odds of worse ratings on SRH with multiple morbidities. A bad rating on SRH was less likely in women with single chronic condition as compared to the reference group. The odds of worse ratings on SRH increased with age only among men. Moderate to Heavy smokers were less likely of a bad or moderate rating compared to non-smokers. The model showed that the variables poverty status, Education and Marital Status were found to be statistically significant predictors of SRH among women. Marital status and income were found to have a protective affect with single, widowed or unmarried women and women from not so poor households having less likelihood of worse rating on SRH. Employed women were half as likely to give a worse rating on SRH compared to unemployed women.

Table 3: Odds of self rated health on multiple morbidity and background characteristics – results from partial proportional odds model

	Males				Females			
	Moderate or Bad SRH vs Good SRH		Bad SRH vs Good or Moderate SRH		Moderate or Bad SRH vs Good SRH		Bad SRH vs Good or Moderate SRH	
Multiple morbidity	OR	C.I 95%	OR	C.I 95%	OR	C.I 95%	OR	C.I 95%
No chronic condition (ref)								
Single chronic condition	1.10	(0.60-2.01)	1.10	(0.60-2.01)	1.49	(0.72-3.06)	**0.45***	(0.20-0.98)
Multiple Chronic Condition	2.61**	(1.44-4.72)	2.61**	(1.44-4.72)	3.96***	(1.90-8.20)	1.31	(0.65-2.66)
Age 40 to 49yrs (Ref)								
50 to 59yrs	1.19	(0.66-2.16)	1.19	(0.66-2.16)	0.86	(0.47-1.58)	0.86	(0.47-1.58)
60 to 69yrs	2.95**	(1.49-5.86)	2.95**	(1.49-5.86)	1.22	(0.63-2.34)	1.22	(0.63-2.34)
>70 yrs	3.81**	(1.54-9.40)	3.81**	(1.54-9.40)	1.65	(0.70-3.90)	1.65	(0.70-3.90)
Education Illiterate (Ref)								
Primary	1.28	(0.72-2.28)	1.28	(0.72-2.28)	1.16	(0.70-1.92)	1.16	(0.70-1.92)
> Secondary	0.74	(0.33-1.66)	0.74	(0.33-1.66)	1.16	(0.27-4.91)	4.46*	(1.01-19.71)
Marital Status Married (Ref)								
Unmarried/Single/Widowed	0.98	(0.41-2.33)	0.98	(0.41-2.33)	0.93	(0.48-1.79)	**0.41***	(0.21-0.79)
Perceived poverty No Deficit (Ref)								
Always Deficit	1.50	(0.74-3.04)	1.50	(0.74-3.04)	**3.04***	(1.57-5.89)	**3.04***	(1.57-5.89)
Occasional Deficit	0.69	(0.34-1.38)	0.69	(0.34-1.38)	1.32	(0.68-2.56)	1.32	(0.68-2.56)
Caste General (Ref)								
OBC	1.36	(0.44-4.15)	1.36	(0.44-4.15)	1.87	(0.60-5.78)	1.87	(0.60-5.78)
SC/ST	1.05	(0.64-1.72)	1.05	(0.64-1.72)	1.20	(0.68-2.12)	1.20	(0.68-2.12)
Occupation Unemployed(Ref)								
Employed	0.61	(0.30-1.24)	0.61	(0.30-1.24)	**0.50***	(0.30-0.84)	**0.50***	(0.30-0.84)
Location Non Remote (Ref)								
Remote	0.78	(0.48-1.28)	0.78	(0.48-1.28)	0.70	(0.43-1.12)	0.70	(0.43-1.12)
BMI (continuous)	0.96	(0.89-1.05)	0.96	(0.89-1.05)	0.96	(0.90-1.02)	0.96	(0.90-1.02)
Smoking Non smokers (Ref)								
Light smokers	0.94	(0.56-1.58)	0.94	(0.56-1.58)	1.68	(0.97-2.94)	1.68	(0.97-2.94)
Moderate to Heavy Smokers	**0.39***	(0.18-0.84)	**0.39***	(0.18-0.84)	0.22	(0.02-2.12)	0.22	(0.02-2.12)
Veg Intake Insufficient (Ref)								
Sufficient	**0.58***	(0.29-1.12)	**0.58***	(0.29-1.12)	0.76	(0.36-1.57)	0.76	(0.36-1.57)

* denotes a p- value of <0.05, ** a p-value of less than 0.01 and *** a p-value of less than 0.001
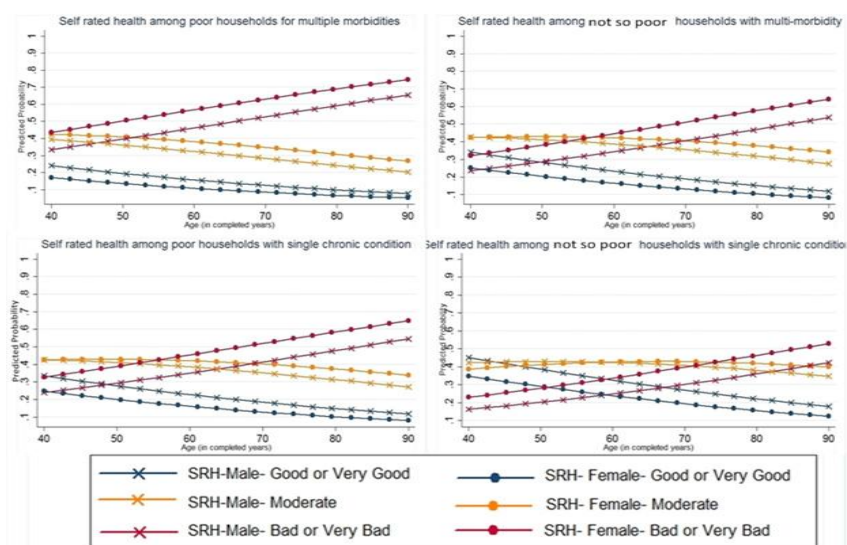
Figure 1: Gender segregated predicted probability of self rated health (SRH) by income status and multi-morbidity

The predicted probability of all the three Likert ratings on self reported health is graphically illustrated in figure 1. We find that the worse rating of health increased with age for both men and women. The predicted probability of poorer rating on SRH was higher for females as compared to males, as seen by the intercept in all the four cases. For respondents with both single and multiple chronic conditions, this predicted probability of poorer health rating was higher in poor households as compared to not so poor households. The intersection point of the lines showing predicted probability of self rated health denotes the age at which the probability of a good rating matches with that of bad rating. The intersection points shift towards younger age groups amongst women when compared to men, poorer households when compared to not so poor households and multiple morbid cases as compared to single conditions.

IV.   Discussion

In our study we tried to explore the gender segregated differentials of self rated health. Two important trends emerge from the analysis- first, multiple morbidities have a clear positive association with worse ratings on the self rated health measure (SRH); second, there is an obvious gender difference in the significance of age, education, economic status, marital status and risk factors with the SRH. The association between multiple morbidities and SRH falls in line with other studies from developed country settings [11]. There is a clear gender difference with women more likely to report poorer health ratings than men[13,20].

Our study found that although morbidity was a common predictors of poor self ratings of health in both males and females, poverty, education and employment showed a significant association only among women. Women from poorer families and those with higher education were more likely to give worse ratings on health while no significant association was found among men. It might be argued that the improved educational status contributes to better knowledge and increased demand or health seeking behavior that is reflected in higher reportage of health conditions and worse rating on SRH among women(24).The affect of poor household income on SRH has been confirmed by many studies[2122]. This has been supported in literature in theories by researchers like Link and Phelan who proposed the theory of fundamental causes that argues that mortality and health inequalities are greatly influenced by the socio-economic position that governs an individuals access to resources[23]. The association of SRH with smoking behavior was negative among both men and women with the odds of worse SRH decreasing among heavy smokers. This can probably be attributed to lower perceptions of health risks and disease among men that is contributing to a lower odds of worse ratings on SRH [24,25]. The lower odds of bad rating on SRH among single or widowed women and not among men has been corroborated by a study conducted by Sudha et.al in southern India[26].

It is important to view the differences between both the sexes in the light of the gender roles, cultural expectations and societal perceptions that influence their perceptions of health. Cultural notions and constructs of gender, masculinity and feminity, demand a more robust exterior from men as compared to women[27,28]. The results explain why self rated health in the context of rural regions like the Sundarbans might to some degree be determined by these societal expectations. Graphical illustration of the predicted probabilities of various rating scores with age clarifies this conception.

V.   Conclusion

Our study shows that multi-morbidity, poverty and gender are strong predictors of Self rated health - an indicator of quality of life. SRH is a predictor of mortality, as multi-morbidities advance with age there is a higher risk of mortality. Poorer SRH among the poor, elderly and women points at many physical and psychosocial distress factors that come with morbidity in an ageing population, again underlining the need for responsive strategies for the elderly, women and the economically vulnerable.

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