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Revisiting the Role of Gender in Health Taxonomy: Evidence from the Elderly in India*

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Abstract

Considering the unprecedented population aging problem and health-related difficulties in India, the study attempts to explore the health-related discrepancies among male and female elderly, with the help of a composite health indicator. The composite health indicator is formulated using the underlying characteristics of different health dimensions and expressed by a single health index as the representative of the overall health status of the elderly. Findings suggest that individual characteristics like, education and marital status have the greater exploratory power of gender health difference than the household characteristics. Socioeconomic variables like education levels, social groups, religious groups and geographic region influence almost similarly in constructing overall health of elderly across gender, however, almost after a decade the health difficulties has accelerated among the higher income classes both for men and women elderly.

Keywords: Aging, gender, health index, health inequality.

JEL: J14, J16, C43, D63

1. Introduction

In the past few decades, advanced medical inventions have increased the life span but cannot always guarantee a decent quality of health. In fact, the health, among the people aged 60 years or more, is quite heterogeneously distributed and the socioeconomic disparities often trigger the health difference in a society. In many societies, females have limited access to household financial resources and less exposure to healthcare services (Roy & Chowdhuri, 2008; Batra, Gupta, & Mukhopadhyay, 2014). Therefore, a gender health inequality is expected to occur in the late life, especially where females discriminatorily treated.

Old age is sensitive to health problems (Waite, 2004) and understanding the pattern of gender difference in old age is complex due to the multidimensional nature of health. In multiple countries' context, literature argued that females have more advantages in terms of mortality, than their male counterparts. Manton (1990) argued that the health difference disappears in the advanced ages. On contrary, it is observed that women face greater incidences of morbidity (McDonough & Walters, 2001) and disabilities (Roy & Chowdhuri, 2008; Hosseinpoor et al., 2012) in their old age. Moreover, a recent study pointed out that females have a higher risk of excess mortality, irrespective of age (Anderson & Ray, 2010). So, the gender health difference in the late life remains ambiguous and needs to be revisited.

For estimation of health difference, selection of health variable is very much crucial. In the geriatric studies, health is mostly measured by objective health conditions like morbidity record (Mundial, 1993; Rajan, Misra & Sarma, 1999; Alam, 2006), existence of chronic ailments (Alam & Mukherjee, 2005; Albert, Alam, & Nizam, 2005), and functional autonomy (Alam & Mukherjee, 2005; Albert, Alam, & Nizam, 2005).

However, the objective-based measures of health capture only the somatic condition but fall short to receive the reflective perceptions of the elderly individuals about their health conditions. For example, if two people have same problem say, knee pain but only one of them has to climb up a staircase every day. In such case, staircase climber will experience more pain than the other person, although, according to the morbidity count there is no difference.

Furthermore, mere information on the presence of illness does not provide the information on the severity of the health problems. The existence of an ailment - if does not create hindrances or difficulties under proper medication - the amount of health difficulty is lower for the ailment than the case where disability follows an ailment. Therefore, to measure a complete status of health, it is required to account the objective indicators, as well as, the subjective experiences.

Subjective measure includes the health experiences of an individual and demonstrates good construct validity (Manton, Stallard & Cordor, 1997), strong association with clinical outcomes (Patrick & Erickson, 1993), disability (Idler & Kasl, 1995), morbidity (Beckett, 2000) and has forecasting power of the mortality risks (Idler & Beyamini, 1997). It should be noted that subjective health indicators are also helpful in identifying the underlying health characteristics as these are congruent with the objective based measures of health (Idler & Beyamini, 1997; Beckett, 2000). In fact, subjective based measures perform well even when enough evidence of objective health measures is absent.

From the above discussion it is clear that only objective health indicator is univariate in nature and might reveal only a partial story and confined in the conditional contexts, under which it has been measured. For example, if a disability is considered as the health indicator then female elderly might have more disabilities because of the high probability of bone-related problems that generally starts among females just after the menopause.

Therefore, for estimation of gender health inequality, a general but comprehensive measurement of health is required. Simultaneous consideration of multiple health indicators provides a comprehensive picture, and takes care of the multidimensional characteristics of health. However, such comprehensive indicator to measure a general health difference is lacking in the literature.

Based on the above-mentioned discussion, the present study decides to address the following gap areas: First, formulation of a comprehensive measure of health, health index, for the elderly. Existing literature mostly have estimated gender health inequality in old age, either by using objective or subjective status of health. These measures lack either multi-dimensionality of health characteristics.

The current study provides a possible solution for uniform and comprehensive measurement of health status – applicable to all elderly and comparable across gender. Second, spread of the gender inequality, based on the health index. To collect the evidence of existing overall health inequality, it involves both distributions (to highlight the entire health discrepancy across the health distribution) and means (to estimate the significance of health inequalities) based methods. Finally, identification of the determining factors of health index for each gender separately.

2. Theoretical Background of Gender and Health Inequality

Two popular sociological theories are used in the literature to explain health inequalities among elderly - Fundamental Cause Theory (FAT) and Life Course Theory (LCT). FAT highlights on the access to resources in securing health because, access of resources expands flexibility in medical treatment and spurs possibility of successful disease treatment – mitigates health risk and occurrence of diseases.

As the explanation of health inequality among the elderly, the concept of FAT is confined in the old age and remains silent regarding lifelong episodic contributors to it. Actually, as people age, health deteriorates naturally, due to the sensitivity of old age towards health problems, but the pace of change in health varies widely across individuals (Vojta et al., 2013).

LCT argues that over time change in health trajectory depends on the relationship between individual and social conditioning. In congruence, Cumulative Advantage Theory (CAT) relies on the lifelong systematic divergence of health across individuals. It views old age health inequality as amalgamated exposure to health risk (Quesnel-Vallée et al., 2015), throughout life. Later Cumulative Inequality Theory (CIT) emerges with the idea of focusing more on the process of health risk accumulation and understanding the interactions among various life domains.

However, instead of the juxtaposition of alternative theories of old-age health inequalities; it is quite evident that social conditioning acts as the mediator between opportunities and health

outcomes. Any individual or group of individuals, belonging to a lower position in the social ladder, has lesser expected health and less frequently demands health care too. From the perspective of socioeconomic determinants of health difference in old age, gender is emerging as an important factor (Roy & Chaudhuri, 2008; Kalavar & Jamuna, 2011) in the developing countries like India.

Most of the Indian societies are characterized by patriarchy where women frequently hold lower positions than the males. Decent amount of literature has studied discrimination against women in different phases of life: family spends more on securing the health of boys in childhood (Asfaw et al., 2008); more frequently boys receive medical treatment before death (Asfaw et al., 2007); a huge amount of girls (between the age of 1 to 2 years) are deprived of full immunization and adequate nutritional requirements (Borooah, 2004); at home, perform almost all domestic works (Denton, Prus & Walters, 2004) even though, contributions of women are hardly recognized (Agarwal, 1994); and also earn lower wage when entire into the labour market (Rustagi, 2005). However, gender discrimination among elderly in Indian society has little explored especially, in the context of health status.

Disadvantaged position of women health (Arber & Cooper, 1999) can be hypothesized in two ways: Firstly, poor resource endowments limit health and well-being of women (Arber & Cooper, 1999; Bird & Rieker, 1999); and secondly, disparate vulnerability to health constituents compels the women to report more health difficulties (McDonough & Walters, 2001). The discourse repeatedly asserts socioeconomic factor as the possible explanation of gender difference in health but it needs to be verified whether substantial health inequality persists, even in the old age, when the biological effect is stronger (Fryta et al., 2003) than the social effect.

3. Data and Methodology

3.1 Data

The study has used nationally representative data from two most recent rounds of health from National Sample Survey (NSS): 60th round (Morbidity and Health Care) and 71st round (Social Consumption: Health) conducted in the year of 2004 and 2014 respectively. The data

have been collected through two-stage stratified sampling. The First Stage Units (FSU) is constituted of rural villages and urban blocks while in the second stage, households are selected from each FSU by Simple Random Sampling without Replacement (SRSWR). In 60th (71st) round, total 73,868 (65,932) households and 3,83,338 (3,33,104) individuals have been surveyed. The article analyses information on 34,831 and 27,245 elderly individuals from 60th and 71st rounds respectively.

3.2 Data Adjustments

Individuals, having the chronological age of 60 years or more, have been considered as elderly. Since the objective of the study is to focus on gender health inequalities among the elderly it has considered 102 years as the upper age boundary because above 102 years, the frequency of the elderly is very low (consists of only 0.09 percent population in the entire dataset) and the data on male elderly is missing for multiple ages - gender health inequality is not possible to capture for these ages.

3.3 Variable Descriptions

3.3.1 Formulation of Health Index

The study uses three health variables to construct a health index. The variables are as follows: the existence of ailment on the day before the day of the survey (as the measure of objective health status); perception about the current status of health (as the subjective measure of health); and physical immobility (as the measure of functional assessment). All the chosen variables depict common health problems for both males and females elderly and therefore, are comparable among the genders.

To construct the index we have used Principal Component Analysis (PCA). The Bartlett test of sphericity (Chi-square = 11813.668 and significant at 1 percent level) suggests that factor analysis applicable for the observed variables. The observed health variables are categorical by nature so the study uses a polychoric correlation matrix to generate the factor loadings. A single factor, with an eigenvalue greater than 1, is identified with factor loadings of 0.658, 0.849 and 0.880 for ailment, physical mobility and perceived health status, respectively.

The predicted factor scores are standardized and used as the health index. The categories of observed health variables are arranged in the ascending order of health problems (i.e. greater value means worse health) implying that the values of computed health index are arrayed from lower to higher health problems.

3.3.2 Independent Variables

Household Characteristics

- Geographic region: Entire country is divided into six regional zones: North (Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Delhi and Uttaranchal)-1 (reference category), Central (Uttar Pradesh, Madhya Pradesh and Chhattisgarh)-2, East (Bihar, Jharkhand, West Bengal and Orissa)-3, North-East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura)-4, West (Gujrat, Maharashtra, Goa, Daman & Diu, and Dadra& Nagar Haveli)-5, and South (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Lakshadweep, Puducherry and Andaman & Nicobar Islands)-6:
- Sector: Rural (reference category)-0 and Urban-1;
- Religion group: Hinduism (reference category)-0, Islam-2 and Others-3;
- Social group: Others/General (reference category)-0, Schedule Caste (SC)/Schedule Tribes (ST)-1; and Other Backward Classes (OBC)-2;
- Income group: To avoid endogeneity problem that might be created due to the inclusion of income/expenditure of the household as a continuous variable in the model, the study uses quantile distribution of Per Capita Monthly Household Expenditure (MPCE). The five quantile income groups are as follows: Poorest (reference category)-0, Poor-1, Middle class-2, Rich-3, and Richest-4.

Individual Characteristics

- Age: To avoid the problem of multicollinearity between age and square of age, the study uses the difference between actual age and the mean age of the distribution (termed as, Demean-age);
- Age-square: It is the square term of Demean-age;
- Marital status: It is a dichotomous variable: Currently married (reference category)-0 and all other categories (divorced, never married and widow) are combined together to form a single category, called 'No spouse'-1;
- Educational status: It measures the completed levels of education and four categories are considered: Illiterate (reference category)-0, Below primary-1, Primary-2, Secondary-3; and Higher secondary & above-4.

3.4 Analytical Tools

Descriptive statistics are exercised to describe health characteristics of the elderly and possible gender difference in objective and subjective measures of health (Table 1). Multiple health dimensions may provide disaggregated idea but for policy implication sometimes a single measure, containing the underlying characteristics of various observed health variables is more helpful.

Therefore, the computed health index has been divided into health tertials and a sample profile of elderly is generated (Table 2) by calculating the column percentages for each socioeconomic indicator across the gender. However, the earlier analysis cannot highlight the gender health inequalities across the health distribution.

To measure the gender disparity in old age health distribution, Lorenz Curve (LC), Pen's Parade and Gini Index (GI) are adopted. LC is the cumulative frequency curve -where, the x-axis represents the cumulative proportion of elderly individuals ranked according to their amount of health problems, beginning with the healthiest elderly - y-axis shows the cumulative proportion of health problems. GI is measured for each gender group separately, as a percentage of the area between the line of perfect equality and inequality.

It is a popular measure of inequality and used in the studies of health inequalities (Kawachi & Kennedy, 1997; Mayer & Sarin, 2002; Berndt, Fisher & Rajendrababu, 2003). Table 3 reports the Gini coefficients and respective confidence intervals using Jackknife standard errors (Modarres & Gastwirth, 2006).

Gender health inequality might get influenced by multiple factors. Above analyses do not measure how significantly the health conditions differ across gender. To find the answers to the problems, the study adopts regression analysis. The model I estimates the effect of gender on the health conditions of the elderly. However, health condition at old age varies for several reasons – differences in socioeconomic conditions are associated with health consequences.

In order to measure how gender health difference exists under the influences of multiple socioeconomic constructs the study successively added different control variables (the household and individual characteristics) in different multiple regression models. The control variables are selected on the basis of existing literature and divided into two broad categories - household and individual characteristics. Impacts of all the factors have also been verified for each gender separately.

4. Results

4.1 Health Profile of the Elderly

Table 1 summarizes the health profile of the elderly population across gender for two different time periods. Each cell calculates the column percentage of the corresponding health category of a particular health variable for the related gender. Considering the entire elderly group, unlike physical mobility and (perceived good/fair) health, the percentages of the non-existence of ailment marginally improve over time (from 72.52% to 74%). Percentages of physical immobility are always higher among female than male elderly and the percentage difference has widened (from 2.47 % to 3.8%) over time.

The existence of ailment is consistently more prevalent among female elderly and they also more frequently report their health as poor. However, the heat difference (i.e. the percentage

of males minus percentage of females) has decreased over time for the presence of ailment though increased for perceiving poor health. The descriptive statistics suggest that health problems are more familiar among elderly women than their male counterpart.

[Table 1]

4.2 Spread of Gender Inequality among the Elders

A distribution based measures insight the health difference at different levels of health condition. Ordinary Lorenz curves (in Figure 1A) demonstrate the graphical representations of the distribution of health conditions of the elderly. The horizontal axis represents cumulative percentages of the elderly population of two different years (2004-05 and 2014-15) – arrayed from the healthiest quantile on the left, to the most frail elderly individuals on the right. The vertical axis calculates the cumulative percentages of health difficulties.

Deviations of actual commutation of health problems, from the line of perfect equality (45°), show the degree of inequality explored. In both the rounds, the slope of LC is steeper at the upper end of the distribution - suggest that for the lower values of health index, the health-related difficulties are less varied but variation goes up as health problems increases. The graphs show that health inequality persists at the lower health controls compared to the upper end of the distribution.

[Figure 1]

Pen's Parades (in Figure 1B) demonstrate the maximum amount of health difficulties, faced by each gender, across the health distribution. In both the time periods, it is evident that women face higher health difficulties compared to male, irrespective of the health quantiles. Curves are steeper in the lowest quantile of the health distribution - suggest that fewer elderly individuals in this quantile have large differences. The gender difference is also greater in this health segment - propose women elderly face poorer health conditions than the male counterpart especially in the healthiest health quantile. However, over time the gender health gap has decreased.

Gini coefficients (in Table 2) show that health problems are more unequally distributed within males than female elderly and the health inequality has increased over time irrespective of the gender. In 2004-05, the nonoverlapping confidence suggests that health difference is among male and female elderly significant, however, over time the health gap has disappeared.

[Table 2]

4.3 Health Difference across Socioeconomic Peripheries

Table 3 represents the health profile of the elderly across socioeconomic identities. It calculates the difference in percentages between male and female elderly - positive value suggests a predominance of male elderly belong to the considered category. Irrespective of the rounds, male elderly belongs to the healthiest quantile in all geographical regions – all social castes – all education levels - rural areas - Hindu and Islam religion - poorest, middle class and richest income groups - old and oldest age group.

Female elderly inevitably dominates the frail health quantile in both the time periods, across all socioeconomic groups. In the initial period, only currently married females had percentages in the healthiest cohort but over time males overturned the situation. For frail health cohort, gap against female elderly widens over time in several socioeconomic vicinities – Central, East, West, South regions – both in rural and urban areas – among Hindu and Islam elderly – for all social castes – for all income classes other than richest – irrespective of marital status – old age group and educational statuses.

[Table 3]

4.4 Determinants of Gender Health Difference among the Elderly

Results of Model I in (Table 4 & 5) reiterate that women elderly have significantly worse health conditions than men and over time the situation goes against women. Irrespective of the periods of time, the coefficient for gender health difference continued to be significant, even after successive controls for household characteristics (Model II, III, and IV). Gender

difference falls sharply once control for marital status included (Model V). Significant and negative coefficients of marital status suggest currently married elderly have smaller health problems.

Further inclusion of individual characteristics like age and age-squared (Model VI) does not cushion the gender health gap but as levels of education (Model VII) and an interaction term between gender & income (Model VIII) class are consequently added in the successive models the magnitudes of the gender coefficients drastically decreased. Model VIII is the full model, has the minimum gender coefficient among all other models of the same period, however, the magnitude has increased over time.

[Tables 4 and 5]

Irrespective of rounds, full models (Model VIII) demonstrate the health problems of elderly is negatively associated with urban residence and among the OBCs compared to the general category of social caste. Health problem decreases significantly with an increase in education level and compared to illiterate, the association is significant for below primary (only in 2004-05), secondary and higher secondary & above educated elderly. Moving from poorest to the upper-income classes, health difficulties significantly reduces. The negative association between rich income class and health index was insignificant in 2004-05 however, in the later period (2014-15) it became significant.

The coefficients of the interaction term (in Model VIII) show no significant health difference among male and female elderly except in the richest income class in 2014-15 – in the highest quantile female elderly have significantly greater health problems than their male counterpart. Figure 2 provides an insight into the gender health difference across the income classes – females have greater health problems irrespective of the income classes and year. The health gap has increased with income in 2004-05 reveals just the opposite picture in 2014-15. However, no clear conclusion can be drawn as confidence intervals overlapped for poor and the richest income class in 2004-05 and 2014-15 respectively.

[Table 6]

Table 6 considers the impact of socioeconomic indicators on the health index, separately for each gender. In 2004-05, male elderly in higher income class significantly achieved lower health problems compared to the poorest class but health index is significantly positively associated with upper income (Rich and Richest) classes, both for male and female elderly in the later period. Irrespective of gender and time, elderly residing in the Central, East, and South India have significantly greater health problems than the North region.

Highly educated male and female elderly (having higher secondary education and/or more) have significantly lower health problems. Marital status and age create a significant difference in overall health for females; however, has no significant impact on the health of males. Compared to Hindu elderly, all Muslim elderly have significantly greater health problems. Except for OBC in 2004-05, there is no significant health difference between general and other social groups. Initially, urban elderly had significantly lower health difficulties than rural counterparts, but over time the health difference disappears for males and turns opposite for females.

[Figures 2 and 3]

5. Discussion

The present study explores the amount of gender health inequalities on the basis of comprehensive health indicator, consists of both - subjective and objective health status of the elderly. The aim of the paper is to capture the gender health difference of the elderly through a composite health measure – reflects the underlying health characteristics and explores most of the variation of the original health variables. All the observed health variables are categorical and categories are arrayed from good to bad health status, implying higher the value of health index, larger the health problems.

When considering individual health indicators, descriptive statistics suggest that elderly women have worse health conditions (Wingard et al., 1989) from all perspectives. Individual health indicator highlights only a single perspective of health and falls short to explore the composite nature of health and related gender difference. Composite health measure – health index provides an overall health difference across gender, taking care of multiplicity of health.

The distribution of health index demonstrates that gender health difference is more prominent in the lower tails, in both time period, and vanishes in the upper quantiles.

Upper quantiles signify greater health problems that probably are associated with extremely unhealthy elderly and/or the oldest age group – when the biological effect is stronger (Fryta et al., 2003) than everything else. Major concerns are underlined in the lower quantiles of health distribution – even in the comparatively better health cohort female elderly have greater health problems indicating that in terms of the overall health, the problem starts much earlier among females than their male counterpart. However, gender health difference gets cushioned overtime.

To insight into the gender health difference, the study focuses on the socioeconomic indicators of health, mostly discussed in the existing literature (Singh et al., 1997; Roy & Chaudhuri, 2008; Hosseinpoor et al., 2012) and tested for various health indicators – the observed health variables used in the present analysis to formulate health index. According to the percentage distributions across various socioeconomic identities, most of the male elderly, belong to the healthy group while frail health is more prevalent among females. However, the mere percentage calculation does not provide how significantly gender influence on overall health, especially, alienating the impact of other variables that might have an influence on health as well.

The regression analysis is a way out to this problem. Regression results suggest that gender difference in combined health significantly persists even when the models are controlled for all individual and household characteristics. Probably the existence, gender health difference for each of the observed health indicators – immobility or disability (Hosseinpoor et al., 2012), the incidence of morbidity (Sen et al., 2002) and perceived health status (Pandey & Ladusigh, 2013) contributes to gender discrepancy in overall health.

Contradicting to the household characteristics, as the individual distinctiveness like education and marital status are incorporated in the models, the health difference substantially reduced. It suggests that elderly gender (overall) health difference is more sensitive to the individual status rather the position of the household.

Prevalently lower educational attainment among women elderly (WHO, 2002) causes lower socioeconomic positions - mitigates the health well-being of female elderly. On the other hand, the existence of spouse generates a sense of social security (especially, in terms of money, since most of the women elderly possess no financial assets) – provides means to secure health - improves the overall health of female and deteriorates the gender health gap. Figure 3 suggests that female elderly are predominantly financially fully dependent on others and probably, therefore, financial security from spouse has a high influence on their overall health.

The contribution of each factor in determining the health index might differ for gender. In the initial period, the negative relation of health index with income class for males suggests more income provides greater access to control health problems – the finding is also congruent with physical immobility and perceived health status as well but with existence of ailment - implying that functional impairment and health perception have greater bearings on health problems in 2004-05 however, over time probably high-income-illnesses (like obesity) spurred among males and started influencing largely on overall health of men.

On the other hand, in 2014-15, females in the higher income classes (Rich and Richest) have worse overall health compared to poorest income class. These income classes have a negative association with perceived health status but positively related with morbidity, indicating that the composite health index is more congruent with the latter and reflects the predominance of high-income-illnesses among upper class female elderly.

Regional differences do not contribute much in creating gender health difference but across regions health difference is significant for both men and women. Education and social-group have an almost similar influence on the overall health of the elderly, irrespective of gender. The presence of spouse is significant for female elderly, especially of the sense of securities in different aspects. Unlike male, age significantly influences the overall health of females probably because, after menopause, the hormonal changes coupled with other difficulties (like a decrease in bone density) accelerate the health problems for female elderly.

6. Conclusion

The study insights the gender dimension and its interplay with other socioeconomic factors in creating differences in overall health status of the elderly. The formulated health index represents the overall health status of elderly considering different dimensions of health and attempts to explore gender health inequality, using a single health measure. To the best of the knowledge, this is the first attempt in formulating composite health measure for elderly in India and measuring related gender health gap – using underlying characteristics of multidimensional health indicators.

The findings suggest improvement in the individual status of female elderly through expanding education and providing social support. Financial as well as mental support – the major importance spouse of women - mostly lacking due to longer life of female elderly – are needed to be secured in improving the overall health of female elderly and reducing the gender health gap.

The study has some limitations. First, the study uses the data on the existence of ailment on the day of the survey but without the severity of the ailment, the information of ailment remains incomplete. Second, gender health difference would have better explored (because the position of women varies from places to places) if regions were disaggregated more elaborately (maybe by states) but doing so in the present analysis was not possible because some states have very low observations. Finally, there is no clear variable for the social support that might have an influence on overall health differences across gender.

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Table 1**Health Profile of the Elderly**

Health variables	2004-05			2014-15		
	Male	Female	Total	Male	Female	Total
Physical mobility						
<i>Mobile</i>	91.74	89.27	90.53	91.81	88.01	89.92
<i>Immobile</i>	8.26	10.73	9.47	8.19	11.99	10.08
Existence of ailment						
<i>No ailment</i>	74.05	72.98	73.52	74	73	74
<i>At least one ailment</i>	25.95	27.02	26.48	26	27	26
Reported health status						
<i>Excellent/Very good</i>	7.03	4	6	7.79	5	6
<i>Good/Fair</i>	70.01	69.44	69.73	68.57	66.67	67.63
<i>Poor</i>	22.97	26.63	24.76	23.64	28.46	26.04

Table 2

Gini Coefficients of Health Inequalities among the Elderly

Gini	2004-05		2014-15	
	Male	Female	Male	Female
Coefficient	0.153	0.147	0.154	0.152
Error	0.001	0.001	0.001	0.001
LL	0.151	0.146	0.152	0.150
UL	0.156	0.149	0.156	0.154

Table 3

Sample Profile of Health Index

Variables	2004-05					
	2004-05			2014-15		
	Healthiest	Moderate	Frail	Healthiest	Moderate	Frail
Region						
<i>North</i>	4.47	-0.41	-4.06	5.82	-1.86	-3.97
<i>Central</i>	3.62	1.6	-5.23	4.17	2.42	-6.58
<i>East</i>	8.36	0.03	-8.38	9.28	0.1	-9.38
<i>North-East</i>	6.76	0.92	-7.68	5.96	0.82	-6.78
<i>West</i>	1.99	0.2	-2.19	1.19	1.41	-2.6
<i>South</i>	3.09	0.3	-3.39	4.65	2.89	-7.54
Sector						
<i>Rural</i>	3.75	0.83	-4.58	3.22	1.64	-4.86
<i>Urban</i>	5.9	-0.83	-5.07	7.77	-0.07	-7.71
Religion						
<i>Hinduism</i>	3.62	0.37	-4	4.71	0.94	-5.64
<i>Islam</i>	6.89	0.21	-7.1	8.1	0.76	-8.85
<i>Others</i>	11.15	-2.95	-8.19	8.01	-0.75	-7.26
Social caste						
<i>SC/ST</i>	5.38	-0.1	-5.28	5.82	0.22	-6.05
<i>OBC</i>	4.18	-0.24	-3.94	4.58	1	-5.56
<i>Others</i>	3.83	0.64	-4.47	5.38	1.13	-6.51
Income class						
<i>Poorest</i>	2.9	0	-2.9	5.95	0.38	-6.33
<i>Poor</i>	4.4	-0.41	-3.99	6.8	-1.05	-5.76
<i>Middle Class</i>	4.32	-0.68	-3.64	5.67	0.69	-6.35
<i>Rich</i>	3.93	0.91	-4.84	5.46	-0.02	-5.44
<i>Richest</i>	7.36	-0.01	-7.36	3.53	2.93	-6.46
Marital status						
<i>No spouse</i>	4.61	-2.91	-1.7	4.26	-2.16	-2.1
<i>Currently married</i>	-0.09	0.93	-0.83	0.18	1.2	-1.37
Age group						
<i>Young-old</i>	5.09	-0.63	-4.45	6.08	-0.41	-5.66
<i>Old-old</i>	4.45	1.15	-5.6	3.61	2.76	-6.37
<i>Oldest-old</i>	3.81	1.99	-5.8	6	2.48	-8.48
Educational status						
<i>Not literate</i>	3.69	-1.61	-2.07	3.72	-0.11	-3.61
<i>Below primary</i>	4.34	-4.22	-0.13	9.14	-3.78	-5.36
<i>Primary</i>	6.28	-3.53	-2.76	5.9	-3.51	-2.37
<i>Secondary</i>	7.86	-4.94	-2.91	6.64	-5.97	-0.67
<i>Higher secondary & above</i>	15.25	-9.41	-5.85	3.44	-3.33	-0.11

Table 4

Regression Results for 2004-05

Variables	Model -I		Model -II		Model -III		Model -IV		Model -V		Model -VI		Model -VII		Model -VIII		
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	
Gender (Male=0; Female=1)	0.06**	0.01	0.07**	0.01	0.07**	0.01	0.07**	0.01	0.03**	0.01	0.06**	0.01	0.05**	0.01	0.03**	0.01	
Regions																	
Central			0.03**	0.01	0.04**	0.01	0.03**	0.01	0.03**	0.01	0.04**	0.01	0.04**	0.01	0.04**	0.01	
East			0.07**	0.01	0.07**	0.01	0.06**	0.01	0.06**	0.01	0.07**	0.01	0.08**	0.01	0.08**	0.01	
North-East			-0.03*	0.01	-0.02*	0.01	-0.02*	0.01	-0.03*	0.01	-0.01	0.01	0.00	0.01	0.00	0.01	
West			-0.01	0.01	-0.01	0.01	-0.01	0.01	-0.01	0.01	-0.01	0.01	0.00	0.01	0.00	0.01	
South			0.06**	0.01	0.06**	0.01	0.06**	0.01	0.06**	0.01	0.06**	0.01	0.06	0.01	0.06**	0.01	
Sector			-0.03**	0.01	-0.03**	0.01	-0.04**	0.01	-0.04**	0.01	-0.04**	0.01	-0.03**	0.01	-0.03**	0.01	
Religion groups																	
Islam					0.08**	0.01	0.08**	0.01	0.08**	0.01	0.09**	0.01	0.08**	0.01	0.08**	0.01	
Others					0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	
Social groups																	
SC/ST					-0.02**	0.01	-0.03**	0.01	-0.03**	0.01	0.00	0.01	-0.01	0.01	-0.01	0.01	
OBC					-0.02*	0.01	-0.02**	0.01	-0.02**	0.01	-0.01	0.01	-0.02*	0.01	-0.01*	0.01	
Income classes																	
Poor							-0.02**	0.01	-0.02**	0.01	-0.02**	0.01	-0.02**	0.01	-0.03**	0.01	
Middle class							-0.03**	0.01	-0.03**	0.01	-0.03**	0.01	-0.02**	0.01	-0.02*	0.01	
Rich							-0.03**	0.01	-0.03**	0.01	-0.03**	0.01	-0.02**	0.01	-0.03**	0.01	
Richest							-0.03**	0.01	-0.03**	0.01	-0.04**	0.01	-0.02	0.01	-0.04**	0.01	
Marital status									-0.10**	0.01	-0.02**	0.01	-0.02**	0.01	-0.02**	0.01	
Age											0.02**	0.00	0.02**	0.00	0.02**	0.00	
Age square											0.00**	0.00	0.00**	0.00	0.00**	0.00	
Levels of education																	
Below primary															-0.01	0.01	
Primary															-0.01	0.01	
Secondary															-0.05**	0.01	
Secondary & above															-0.09**	0.01	
Gender*Income classes																	
Poor																0.02	0.02
Middle class																0.01	0.02
Rich																0.02	0.02
Richest																0.05**	0.02
Constant	1.63**	0.00	1.61**	0.01	1.61**	0.01	1.64**	0.01	1.72**	0.01	1.66**	0.01	1.66**	0.01	1.67**	0.01	
Model summary																	
F-stat	136**		44**		36**		28**		41**		153**		128**		109**		
Observations	32994		31326		31319		31317		31317		31317		31317		31317		

Note: ** and * imply 1% and 5% levels of significance, respectively.

Table 5

Regression Results for 2014-15

Variables	Model -I		Model -II		Model -III		Model -IV		Model -V		Model -VI		Model -VII		Model -VIII	
	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.	β	S.E.
Gender (<i>Male=0; Female=1</i>)	0.08**	0.01	0.08**	0.01	0.08**	0.01	0.08**	0.01	0.03**	0.01	0.07**	0.01	0.05**	0.01	0.03**	0.01
Regions																
Central			0.03**	0.01	0.04**	0.01	0.05**	0.01	0.04**	0.01	0.05**	0.01	0.06**	0.01	0.04**	0.01
East			0.10**	0.01	0.10**	0.01	0.11**	0.01	0.11**	0.01	0.11**	0.01	0.12**	0.01	0.08**	0.01
North-East			-0.04**	0.01	-0.03**	0.01	-0.03	0.01	-0.03**	0.01	-0.03	0.01	-0.02	0.01	0.00	0.01
West			-0.09**	0.01	-0.08**	0.01	-0.08**	0.01	-0.08**	0.01	-0.08**	0.01	-0.08**	0.01	0.00	0.01
South			0.11**	0.01	0.12**	0.01	0.11**	0.01	0.11**	0.01	0.11**	0.01	0.11**	0.01	0.06**	0.01
Sector			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03**	0.01	-0.03**	0.01
Religion groups																
Islam					0.10**	0.01	0.11**	0.01	0.11**	0.01	0.12**	0.01	0.11**	0.01	0.08**	0.01
Others					0.00	0.01	-0.01	0.01	0.00	0.01	-0.01	0.01	-0.01	0.01	0.00	0.01
Social groups																
SC/ST					-0.02*	0.01	-0.01	0.01	-0.02	0.01	0.01	0.01	-0.01	0.01	-0.01	0.01
OBC					-0.02*	0.01	-0.01	0.01	-0.01	0.01	0.00	0.01	-0.01	0.01	-0.01*	0.01
Income classes																
Poor							0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	-0.03**	0.01
Middle class							0.02	0.01	0.02*	0.01	0.02	0.01	0.03**	0.01	-0.02*	0.01
Rich							0.01	0.01	0.02	0.01	0.01	0.01	0.03**	0.01	-0.03	0.01
Richest							0.03**	0.01	0.04**	0.01	0.03**	0.01	0.06**	0.01	-0.04**	0.01
Marital status									-0.13**	0.01	-0.04**	0.01	-0.04**	0.01	-0.02**	0.01
Age											0.02**	0.00	0.02**	0.00	0.02**	0.00
Age square											0.00	0.00	0.00	0.00	0.00**	0.00
Levels of education																
Below primary															-0.01	0.01
Primary															-0.02	0.01
Secondary															-0.06**	0.01
Secondary & above															-0.13**	0.01
Gender*Income classes																
Poor																0.02
Middle class																0.01
Rich																0.02
Richest																0.05**
Constant	1.63**	0.00	1.59**	0.01	1.58**	0.01	1.56**	0.01	1.67**	0.01	1.59**	0.01	1.60**	0.01	1.67**	0.01
Model summary																
F-stat	158**		99**		75**		56**		74**		157**		136**		115**	
Observations	27221		25850		25850		25846		25846		25846		25846		25846	

Note: ** and * imply 1% and 5% levels of significance, respectively.

Table 6

Determinants of Health Index across Gender

Variables	Male				Female			
	2004-05		2014-15		2004-05		2014-15	
	β	S. E.	β	S. E.	β	S. E.	β	S. E.
Regions								
Central	0.04**	0.01	0.06**	0.02	0.04**	0.01	0.06**	0.02
East	0.07**	0.01	0.10**	0.02	0.09**	0.01	0.14**	0.02
North-East	0.00	0.02	-0.02	0.02	-0.01	0.02	-0.02	0.02
West	0.01	0.01	-0.07**	0.02	-0.02	0.01	-0.09**	0.02
South	0.08**	0.01	0.11**	0.01	0.04**	0.01	0.12**	0.01
Sector	-0.02*	0.01	0.01	0.01	-0.03**	0.01	0.04**	0.01
Religion groups								
Islam	0.07**	0.01	0.09**	0.01	0.10**	0.01	0.12**	0.01
Others	-0.03*	0.01	-0.02	0.02	0.03*	0.01	0.01	0.02
Social groups								
SC/ST	-0.02	0.01	-0.01	0.01	-0.01	0.01	-0.01	0.01
OBC	-0.03**	0.01	-0.01	0.01	0.00	0.01	-0.01	0.01
Income classes								
Poor	-0.03*	0.01	0.00	0.01	-0.01	0.01	0.00	0.01
Middle class	-0.02*	0.01	0.03*	0.01	-0.02	0.01	0.02	0.01
Rich	-0.03*	0.01	0.03*	0.01	-0.02	0.01	0.03*	0.01
Richest	-0.03**	0.01	0.07**	0.01	0.00	0.01	0.06**	0.02
Marital status	-0.01	0.01	-0.03	0.01	-0.03**	0.01	-0.04**	0.01
Age	0.02	0.00	0.02	0.00	0.02**	0.00	0.02**	0.00
Square of age	0.00	0.00	0.00*	0.00	0.00	0.00	0.00	0.00
Levels of education								
Below primary	-0.02	0.01	-0.02	0.01	-0.01	0.01	0.00	0.01
Primary	-0.02	0.01	-0.02	0.01	0.00	0.02	-0.02	0.02
Secondary	-0.07**	0.01	-0.06**	0.01	-0.01	0.02	-0.06**	0.01
secondary & above	-0.11**	0.02	-0.13**	0.01	0.01	0.03	-0.15**	0.02
Constant	1.68**	0.02	1.62**	0.02	1.70**	0.02	1.63**	0.02
Model summaries								
Observation	15990		13017		15327		12829	
F-statistics (df=21)	69.3**		66.4**		62.2**		71.4**	

Note: ** and * imply 1% and 5% levels of significance, respectively.

Figure 1A

Lorenz Curves

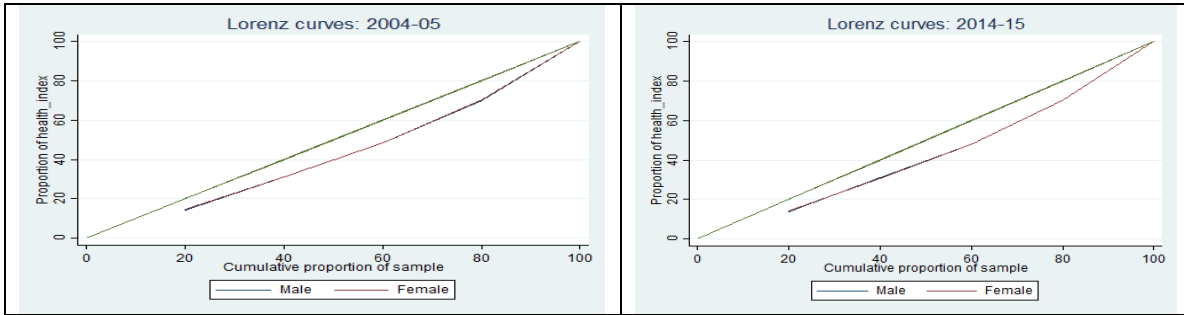


Figure 1B

Pen's Parade

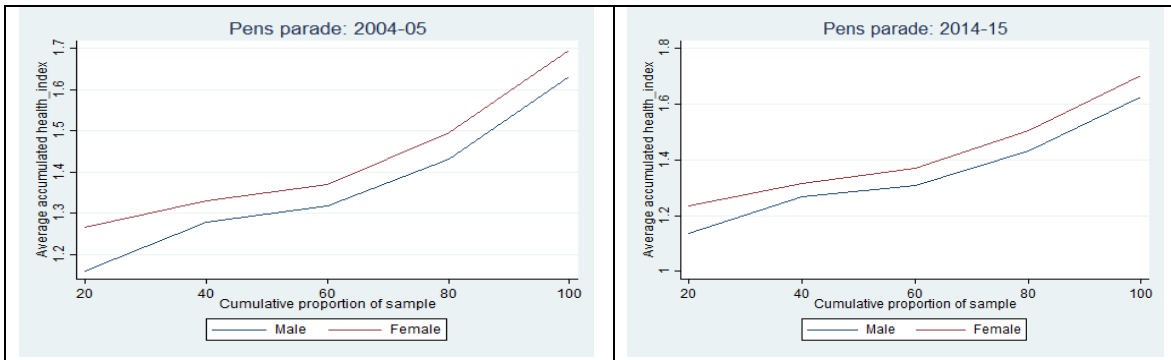


Figure 2

Predictive Margins of Interaction between Income Class and Gender

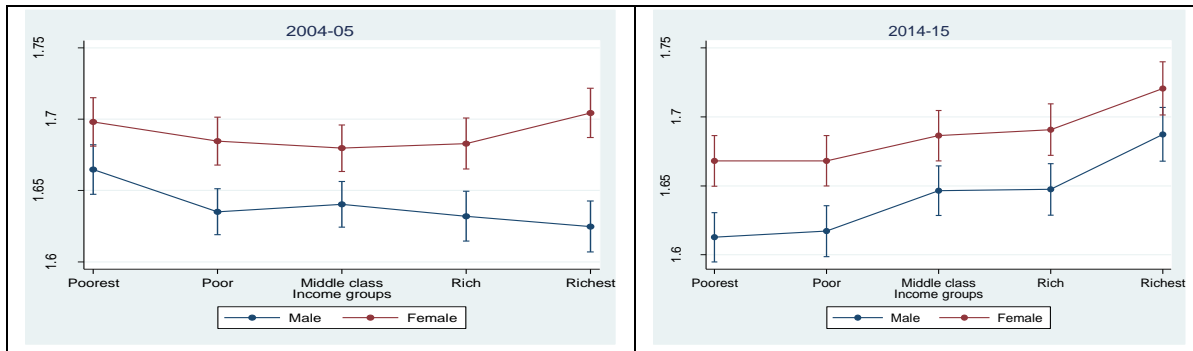


Figure 3

Economic Independence among the Elderly

