# Social context and the health status among the older adults in India

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Abstract

The present study investigates the state of health of the older adults in India from a socio-economic and cultural perspective. It is based on a countrywide representative sample of 29420 older adults, which was collected as a part of the 60th round of the National Sample Survey in 2004. The state of physical health is defined in terms of the count of chronic diseases and the count of impairments suffered by an older adult. A conceptual framework consisting of the socio-economic and cultural factors, that are relevant to the life of the older adults, is proposed to model the association between the physical health and the socio-economic and cultural factors. The findings based on the Poisson regression models affirm the association between ill health and the state of financial dependence. Further, the older males are found to have higher number of expected count of chronic diseases and impairments when compared to the older females. Similarly, the widowed older adults experience a higher expected count of chronic diseases and impairments when compared to their currently married counterparts. Other factors namely, education, living arrangements, economic affluence of the household, place of residence, caste and religion are also found to play significant role in determining the health of the older adults.

Keywords: Disease, Health, Impairment, India, Older Adults, Social Determinant

**Introduction**

Enhancing life expectancies are one of the characteristic features of an ageing population resulting in a steadily increasing number and proportion of older adults in the population. However, this process poses a challenge to the Quality of Life (QoL) (Walker and Mollenkopf, 2007) in the years that are added to the latter domain of lifespan. Health, an indispensable integrant of the QoL, is no exception.

An inclusive definition of health is given by the World Health Organisation as "a state of complete physical, mental, and social well-being and not merely the absence of diseases and infirmities" (WHO, 1978). Thus, morbidity, disability, self-rated health, and mental health may be regarded as different aspects of health (Deeg, 2007). Morbidities, both chronic and acute, and impairments, that lead to various kinds of disabilities, may be classified among the physical aspects of the health. The life expectancy at birth is a measure of the overall health conditions in a population. For that reason it is considered as one of the indicators of human development (UNDP, 2012). The disease free life expectancy and the disability free life expectancy are other measures of health conditions in a population that are relevant in the context of ageing. The higher the value of these measures of health the healthier is the population. However, these measures are aggregate measures, defined on a macro level. For an individual, the state of being disease free and impairment free are indispensable for achieving sound physical health.

The importance of sound health cannot be denied as it is pivotal for all day-to-day activities. The process of ageing of populations is concerning in the perspective of the state of health (Lloyd-Sherlock, 2000) of the older adults. As this segment of population starts occupying more and more demographic space, the issues related to older adults occupy prominence among the issues concerning a society. India has an ageing population and the state of health of the older adults demands due attention. In the year 1901 the life expectancy at birth was 22.5 years for males and 23.3 years for females. Estimates from the 2011 census, for the same, are 67.3 years for males and 69.6 years for females for the period 2011-15 (Census of India, 2011). Citing from earlier studies (Satyanarayana and Medappa, 1997; Sharma and Agarwal, 1996) Prakash (2003) has pointed that "the progress India has made in extending the life span of its citizens has not been carried over to providing a healthy and disability – free old age." In a study based on the National Sample Survey data Alam and Karan (2011) emphasize that the proportion of older adults living in pain and without access to health facilities is growing in India. Added to this, the older adults in India carry "double disease burden" of degenerative and infectious diseases (Kumar, 2003).

Although, biological processes are responsible for the state of health; nevertheless the pathways to ill health can be traced to socio-economic factors (Link and Phelan, 1995). This means that health is

associated with the socio-economic environment. This association has been investigated in various cultural settings across the globe. Studies conducted for the non-older adult populations (Antonovsky, 1967; Fox, 1989; Kadushin, 1964; Kitagawa and Hauser, 1973; Mackenbach et al., 1997) affirm this association. Affirmation of such an association for the older adults can be seen in various studies conducted in, China, South East Asia and the developed world (Backlund et al., 1996; Berkman and Gurland, 1998; Beydoun and Poplin, 2005; Cambois et al., 2001; Grundy and Sloggett, 2002; Hayward and Gorman, 2004; Huisman et al., 2003; Kaneda et al.,2004; Matthews et al., 2006; Smith and Kington, 1997; Zimmer and Amornsirisomboon, 2001; Zimmer et al.,2003; Zimmer and House,2003; Zimmer et al., 2004; Zimmer and Kwomg, 2004; Zimmer, 2008; Huisman et al., 2003; von dem et al., 2003).

Studies from India, conducted in the districts of the state of Tamilnadu (Audinarayana, 2005; Audinarayana, 2012), the metropolitan cities, namely, Mumbai (Chattopadhyay and Roy, 2005; SivaRaju, 2002) and New Delhi (Alam, 2006) also point to the interplay of socio-economic environment and health. Similar results for the self-perceived health have been reported in the studies conducted by Sudha et al. (2006) and Husain and Ghosh (2010). Prakash (2003) has given an exhaustive account of various studies conducted in India in the context of morbidity and disability among the older adults. Still, the extent of this interplay is to be investigated on a country-wide scale, especially for the chronic diseases and impairments. The present study is an attempt to investigate this interplay for the Indian socio-economic environment. The socio-economic environment of older adults comprises of various factors relevant to the life of the older adults. For example these factors may include the marital status, the living arrangements and the financial dependency to name a few. Further, one needs to distinguish between the economic status of the household an older adult belongs to and financial dependence of an older adult. This distinction has rarely been made in the literature. The present study incorporates these aspects into the proposed model for health.

**Conceptual framework**

As mentioned earlier for an individual the state of being disease free and impairment free defines good physical health. Thus, the number of acute and chronic morbidities suffered by an individual and the number of impairments suffered by an individual can serve as indicators of the physical aspects of health. In the present study these are visualised as the burden of diseases and the burden of impairments respectively.

The socio-economic and cultural factors can be viewed as various kinds of exposures that the older adults get subjected to during their lifetime. Moreover, the population of older adults is heterogeneous with respect to the socio-economic and cultural aspects. The differentials in the socio-economic and

cultural aspects may correspond to the differentials in the health of the older adults. However, if such an association is confirmed, it may be possible to control and ameliorate some of these factors that shape the health at older ages. This, in effect, may ensure sound health and thus healthy aging.

The conceptual framework used in the present study rests partly on the framework outlined in the final report of the WHO Commission on the Social Determinants of Health (Kelly et al., 2009; WHO, 2007). In brief, the framework consists of three levels of factors that influence health and health differentials in a society. These three levels are namely, the socio-economic and political context (policies at national and international level), structural determinants of health inequities (income, education, occupation, social class, race/ethnicity and sex) and the intermediary determinants of health (material, psychosocial, behavioural and biological, health system etc.).

These variables operate at the micro/individual level, the semi-macro/household level and macro level. The present study shall study the association between health and structural determinants of health only as the information on intermediary variables is not available and the effect of socio-economic and political environment will be similar for all the older adults in a country.

The variables, namely, income, education, occupation, social class, race/ethnicity and sex describe the socio-economic position of an individual. The variables social class and race/ethnicity, which form a part of the WHO framework, are not included as they are not relevant to the Indian older adult population. However, the present study adds marital status, age, living arrangements, caste and religion to the list of structural determinants as they are relevant in the social context of the older adults in India. The variables used in the present study are discussed in what follows.

**Data and methods**

The 60$^{th}$ round of the national sample survey, conducted during 2004, provides rich information on diseases, impairments, self-rated health, and health seeking behaviour of older adults (national sample survey organisation, 2006). All the persons aged 60 years or more constitute the population of older adults. The data provide information on 38 diseases namely, diarrhea/ dysentery, diabetes mellitus, gastritis/gastric or peptic ulcer, under- nutrition, worm infestation, anemia, amoebiosis, sexually transmitted diseases, hepatitis/jaundice, malaria, heart disease, eruptive, hypertension, mumps, respiratory diseases, diphtheria, tuberculosis, whooping cough, bronchial asthma, fever of unknown origin, disorders of joints and bones, tetanus, diseases of kidney/urinary system, filariasis / elephantiasis, prostatic disorders, gynecological disorders, neurological disorders, psychiatric disorders, conjunctivitis, diseases of mouth/teeth/gum, glaucoma, accidents/injuries/burns/fractures/poisoning, cataract, cancer and other tumors, diseases of skin, other

diagnosed ailments, goiter and other undiagnosed ailments. Information on 4sensory impairments (hereafter called impairments) namely, locomotor, visual including blindness (excluding cataract), speech and hearing is also provided. It also provides rich details pertaining to the socio-economic and cultural aspects of the older adults. For the purpose of the present study, all the observations are weighted to make them representative of the older adult population.

As mentioned earlier, the burden of diseases and the burden of impairments for the older adults are respectively defined as the count of chronic diseases and the count of impairments reported by an older adult. These definitions are based on the assumption that all the chronic diseases/impairments considered in the study are equally harmful as far as maintenance of sound health is concerned. Thus, a count of 'n' chronic diseases/impairments means a state of severity 'n', irrespective of the nature and type of chronic diseases/impairments. Further, to keep the things simple, it is assumed that all the diseases/impairments occur independently of each other. Thus, the difference in severity for the counts 'n' and 'n+1' is same as the difference in severity of the counts 'n+1' and 'n+2'. Further, appearance of a chronic disease/impairment in an older adult is a random event that takes place in response to various socio-economic and cultural exposures. Thus, the count of diseases and the count of impairments are random variables. The conditional distribution of the count of chronic diseases/impairments conditioned on the age has been verified to follow a Poisson probability model for the given data. For this reason, the present study proposes Poisson regression model for modelling association of the count of chronic diseases and impairments with the socio-economic and cultural factors.

As indicated earlier the age, the gender, the marital status, the financial dependence, the level of education, the living arrangements, the household economic condition, the place of residence, the caste and the religion form the set of independent variable in the above mentioned regression models. Economic well-being of a household is reflected in the per capita monthly expenditure (PCME) of the household. The quintiles for the PCME are used to group the households into five economic strata to be called as first, second, third, fourth and fifth quintiles in the order of ascending economic affluence. These quintiles are formed separately for the rural and the urban areas as the distribution patterns of expenditure are different in the two places of residence. The health of older adults in the fifth quintile shall be considered as a reference for comparing the health status in the rest of the quintiles. Irrespective of the state of economic affluence of a household, the older adult residing in the household may be dependent financially on others for his/her day to day needs. Therefore, the financial condition of an older adult may be classified into one of the three states namely, dependent, partially dependent or independent. Out of these three states of financial dependence, the latter one makes an older adult least constrained with respect to financial resources. Thus, health at this state may serve as a reference for comparing the health in rest of the states.

Health seeking behaviour of an older adult is guided by his/her level of awareness regarding health. It is opined that the more the level of education the more is the awareness regarding health. Therefore, education is included as an explanatory variable. The variable is categorical here with three categories namely, 'illiterate', 'literate but below ten years of schooling' and 'ten or more years of education.' The last category may serve as a reference to compare the health status in the other two categories.

Risk of losing spouse looms large at the older ages. In the Indian society remarriage/marriage at older ages is rare. Therefore, being widowed can be seen as the future transition state of the married older adults. Further, a small number of older adults never got married or are divorced or got separated from their spouse due to some reason. In the present study the marital status of this minority shall be called 'others'. The other two categories of marital status are 'currently married' and 'widowed'. Losing spouse may push an older adult into social neglect. This may affect his/her overall health. Therefore, in the present study the interest lies in comparing the health of the widowed with reference to the health of currently married older adults.

Another important aspect of the socio-economic life of the older adults is their living arrangements. Living arrangements indicate how the older adults live surrounded by other household members in the shared living space. There are basically two types of living arrangements namely, alone and co-residence. Staying alone or with spouse only is called 'alone' otherwise it is called 'co-residence'.
The cultural factors relevant to the Indian scenario are the caste and the religion. Castes are social groups classified as the scheduled castes (SC), the scheduled tribes (ST) and the rest of the population to be called as the general castes. Due to socially disadvantageous position of SC and ST the study intends to compare the health status of older adults belonging to these categories with respect to the health status of those belonging to the category 'general castes'. The religious categories considered in the present study are Christians, Muslims (the major minority religious groups in India) and the rest of the religious groups that serve as a reference.

It is of prime importance to study the effect of increasing age on the health of the older adults. Hence, the present study includes age along with the socio-economic and cultural factors as an explanatory variable.

Two Poisson regression models are compared for each of the aspects of physical health namely, the burden of chronic diseases and the burden of impairments. Model–I includes only the age as a covariate while Model–II includes the socio-economic and cultural factors along with the age as covariates. The latter model is of prime interest for the present study. Model-I serves as a comparison to assess the gain in the predictive power of the Model-II. To assess the fit of the models the chi-

square test is applied and deviance $R^2$ is calculated. The analyses were carried out with the help of the SPSS software.

**Findings**

The present study is based on a nationally representative sample of 29102 older adults. 77% of the respondents reside in rural areas. The sex-ratio is 985.40. The mean age of the older adults is 67.07 years. 66.1% of older adults are illiterate. 61.3% are reported to be married and 83.4% are co residents. Only 33.7% are financially independent. Characteristics of the sample by gender are shown in Table 1. An overview of the dependence of the burden of chronic diseases and the burden of impairments on age is shown in Figure 1 and Figure 2 respectively. Both the indicators of ill health show a rise with increasing age.

Similar results for different categories of the independent variables are shown in Figure-3 and Figure-4 respectively. The burden of chronic diseases show highest prevalence rates for the urban, the older males, the co-resident, the widowed, the financially dependent, those having more than 10 years of education, the general castes, those belonging to the religious group Christians and those belonging to most affluent households. Similarly, the burden of chronic impairments shows the highest prevalence rates for the rural, the older females, the widowed, the financially dependent, the illiterates, and those belonging to the religious group Christians.

The Poisson regression model incorporates all these factors simultaneously. The effect of each of the significant socio-economic and cultural factors on the expected count of chronic diseases/impairments (called the expected count hereafter) for the older adults is discussed below while controlling for the rest of the regressors.

**Burden of chronic diseases**

The expected count increases by 2% per year with an increase in the age of older adults. With an expect count 9% more, the older males are found to be more prone to chronic diseases when compared to the older females. Similarly, the widowed have an expected count 8% more than the currently married ones. The financial situation also takes a toll on the health of older adults. It is evident from the table that the dependent and the partially dependent older adults report 50% and 29% more chronic diseases when compared to the financially independent older adults.

The illiterates have 31% lesser expected count when compared to the older adults having 10 or more years of education. The older adults living in “alone” kind of living arrangement have 7% lesser

expected count when compared to the older adults living in “co-residence” kind of living arrangements. As one moves from the highest stratum of economic affluence to the strata of lower economic affluence in the descending order the expected count falls by 36%, 27%, 20% and 15% respectively when compared to the highest stratum of economic affluence. The older adults residing in rural areas are less prone to chronic diseases as their expected count is 21% lower than the older adults residing in the urban areas.

The differentials in health are also reflected in cultural factors namely caste and religion. The expected count for the older adults belonging to the scheduled tribes is 28% lesser than that of the older adults belonging to the general castes. Similarly, the older adults belonging to the religious communities, namely, Christianity and Islam are found to have 35% and 37% higher expected count when compared to the older adults belonging to the rest of the religious communities.

**Burden of impairments**

Similar to the findings for the burden of chronic diseases, the socio-economic and cultural factors are found to be associated with this aspect of physical health also. However, unlike the former case a fewer number of socio-economic and cultural factors show significant association with the burden of impairments. These factors are the age, the marital status, the financial dependence, the education, the living arrangements and religion.

The widowed older adults have an excess of 9% of the expected count when compared to the currently married older adults. Being financially dependent or partially dependent enhances the expected count by 65% and 36% respectively when compared to the financially independent older adults. For the illiterate older adults and for those older adults who had less than 10 years of school education, the expected count is about 23% more than that for those older adults who had more than 10 years of education. Further, the older adults belonging to the religious groups namely, Christianity and Islam are found to have 17% and 13% more expected count respectively when compared to the rest of the religious groups.

**Discussion**

Findings of the present study confirm the association between the health status of older adults and the socio-economic and cultural factors. The differentials in the socio-economic and cultural factors correspond to the differentials in the burden of diseases and the burden of impairments among the older adults.

On the one hand the economic dependency of older adults is associated with greater burden of chronic diseases/impairments, whereas, on the other hand the lower the economic status of a household the lower is the burden of diseases. These findings are not in agreement in general with the other studies on older adults carried out in different socio-cultural settings (Backlund et al., 1996; Berkman and Gurland, 1998; Grundy and Sloggett, 2002; Huisman et al., 2003; Matthews et al., 2006; von dem et al., 2003; Zimmer, 2008) as these studies show a positive association of health with the economic status of the household. However, findings of the present study are not directly comparable with other such studies because of the use of different indicators of health and the conceptual framework. This pattern is indicative of higher prevalence of chronic diseases and impairments among poor (financially dependent older adults). Underutilization of available health care services among them (Fried and Wallace, 1992; Mahal et al., 2000) may be responsible for such patterns. To reduce the effect of economic factors on overall health status of older adults, older adults with low or no income may be provided with adequate financial assistance.

The widowhood among older adults is found to be associated with ill health. This finding of the present investigation is in contrast to the study by Zimmer (2008) where the marital status was found not to be associated with health. The greater burden of diseases and impairments associated with the widowhood and increasing age might be less felt through social reforms and greater government and private institutional efforts towards intensive rehabilitation measures through hospitals and health bodies.

The effect of education is discernible but the associations point in opposite direction. The burden of chronic diseases decreases relatively with the fall in the level of education, whereas, the burden of impairments increases relatively with the fall in the level of education. The findings of the present study, thus, do not totally agree with the findings of the studies in other developing countries (Liang et al., 2000; Liang et al., 2001; Zimmer, Chayovan & Natividad, 2004; Zimmer and Kwong, 2004).

The effects of only few modifiable socio-economic and cultural factors can be controlled through joint efforts of government and non-government organizations. Financial dependence is one such factor. The health care facilities need to reach the financially disadvantaged older adults. There are other factors which are non-modifiable, for example, age and widowhood. Widowhood is associated with greater burden of chronic diseases and impairments. The reasons for this association may be due to the fall in the social status that accompanies widowhood. In India, the issues related to older adults have found voice in the National Policy on older Persons (NPOP) that was adopted in 1999. With the prime focus of well being the NPOP enunciates a number of areas of concern needing to be addressed through policy initiatives. These include pension cover for all, heavily subsidized health services and housing for older adults (Prakash, 2003). Added to this is the enactment of the Maintenance and

Welfare of Parents and Senior Citizens Bill, 2007, that has provisions for addressing the financial security and medical care of the older adults. However, the fact remains that there are no separate health care facilities for the older adults in India (Kumar, 2003). Moreover, due to poverty, distance, lack of escort and immobility the formal health care services remain unutilized (Kumar, 1996). As most geriatric morbidities are preventable and take effect over an extended period of time a life course perspective to the health of the older adults is needed (Kumar, 2003). Added to this the health care may be made available at the doorsteps of the older adults.

The present study emphasizes the influence of the socio-economic and cultural environment on the health of older adults in India. The conceptual construct is wide enough to include a large number of potential correlates of health. Further, the empirical results indicate the appropriateness of the count models for quantifying the burden of ill-health among the older adults. This empirical finding needs to be tested in different cultural settings, other than the present one, for generalization. The present study is limited to the physical aspects of health i.e. chronic diseases and impairments. Other important aspects of health namely, emotional well-being and the self-rated health also need to be studied for a comprehensive exposition of the QoL of the older adults. In addition to this, the data give information only on the self-reported diseases. Data on self-reporting may have the lacuna of under reporting as certain diseases like heart diseases need diagnosis to be ascertained. In such cases the actual chronic condition might go underreported. Information on the time of the onset of a disease is not available for the given data. The assumption that the occurrence of a disease is independent of the occurrence of any other disease is a simplification of the real life scenario. The complexities arising out of the existence of co-morbidities makes the modelling arduous unless such simplifying assumptions are introduced in the model. The present study can at most claim to infer about the association of various socio-economic and cultural factors with the burden of ill health. The nature of the data doesn't permit the investigation of the causal pathways (Adama et al., 2003) to ill health. The variables included in the model can account for only a part of the information on the health of older adults. This is clear from the values of the deviance $R^2$ of the models for chronic diseases (deviance $R^2 = 0.5$) and for impairments (deviance $R^2 = 0.4$). The rest of the information may lie with the biological and behavioural factors that need further investigation. The importance of the socio-economic and cultural factors for explaining the health aspect of the QoL of older adults could perhaps be better established through the choice of more appropriate variables and more apt modelling. Such studies, however, are valuable for designing appropriate intervention programmes for the older adults.

**Conclusion**

The share of older adults in the population of India is projected to reach 12.4% by 2026 (Census of India, 2006). This trend is expected to continue in foreseeable future. Older adults are distinct from

the rest of the population in various socio-economic aspects like work participation rates, likelihood of being married, financial dependence, the disease patterns and the needs of health care to name a few. Hence, ensuring to the older adults a good QoL is as necessary as addressing the issues like malnutrition among children, maternal and child health, women empowerment and family welfare. In other words issues related to the QoL of the older adults need to be considered on equal footing along with other high priority issues. Health is an important integrant of the QoL and thus needs to be addressed in a long term policy perspective. To put the matters explicitly we need to know the need of geriatric care in India and how to fulfil the unmet need of geriatric care. Specially designed country wide sample surveys are a pre requisite for obtaining reliable estimates of the need. Further, the quantum and the type of geriatric care required may differ from region to region as the process of ageing is not uniform across the states of India. Therefore, region specific socio-economic and health policies may be needed to mitigate the effect of financial constraints, widowhood, gender, caste and religion on the health related QoL of older adults.

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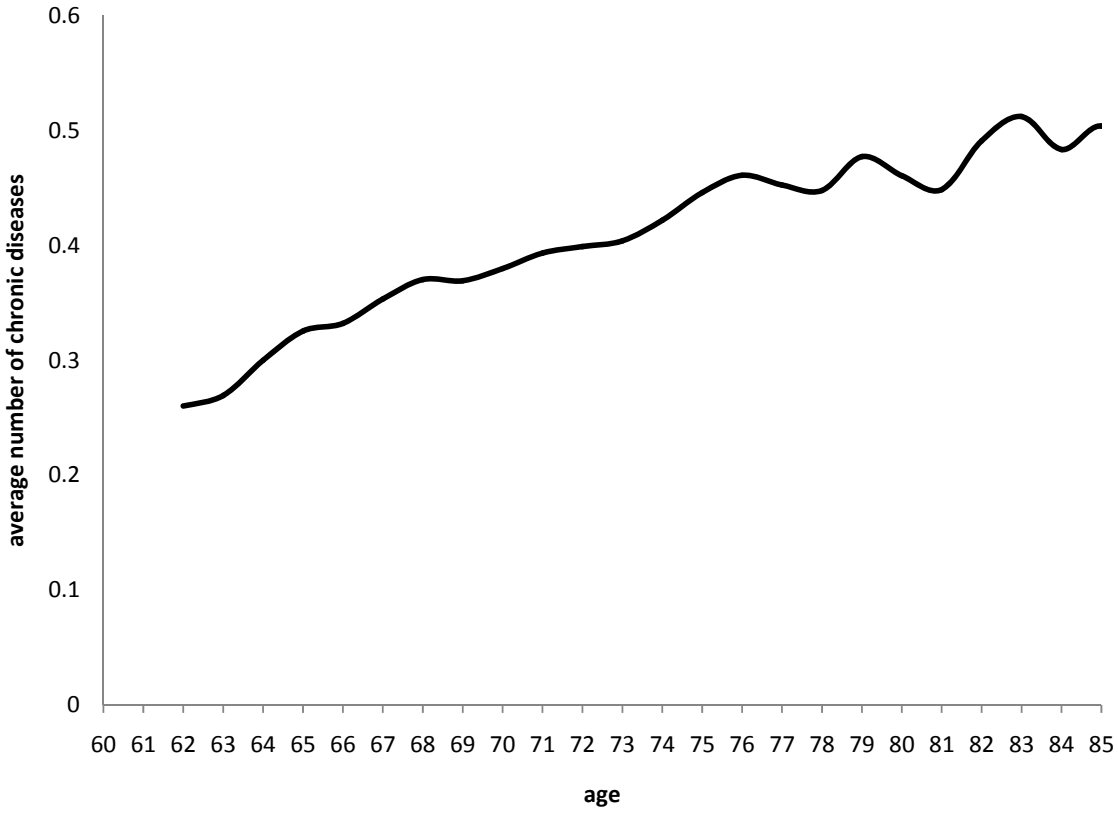


**Figure 1: average number of chronic diseases among older adults in India by age**

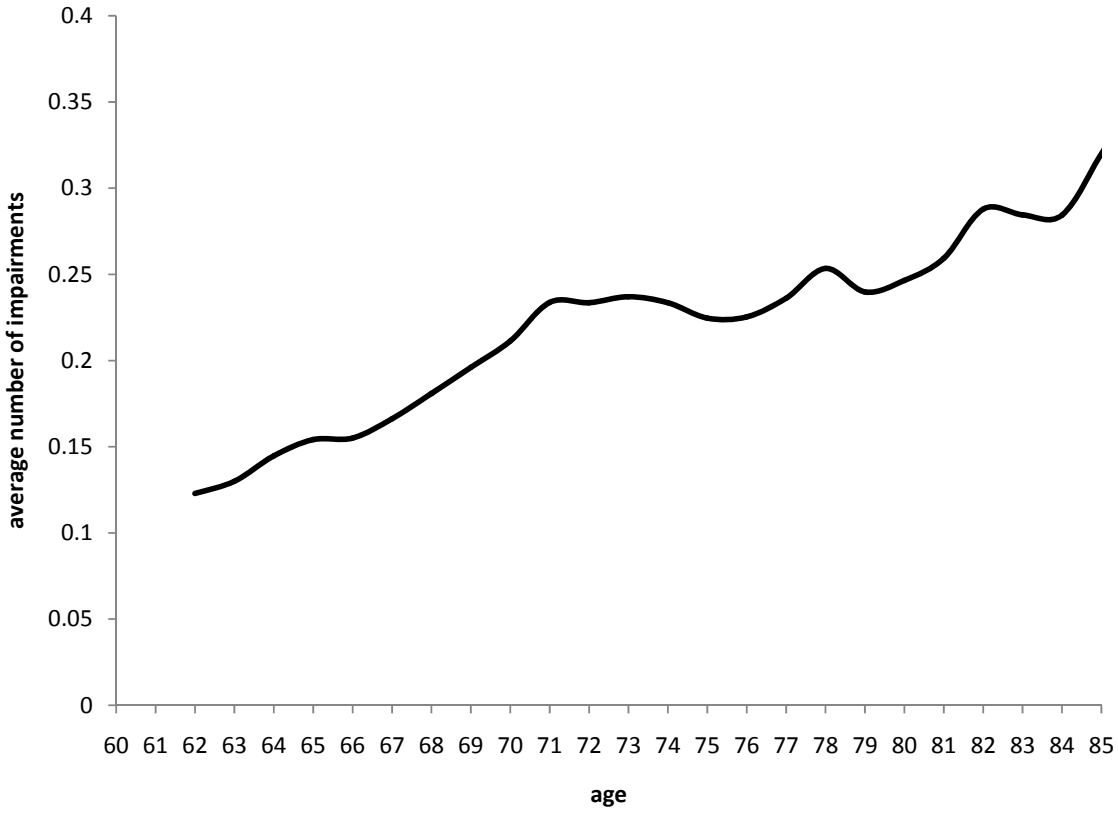


**Figure 2: average burden of impairments among older adults in India by age**

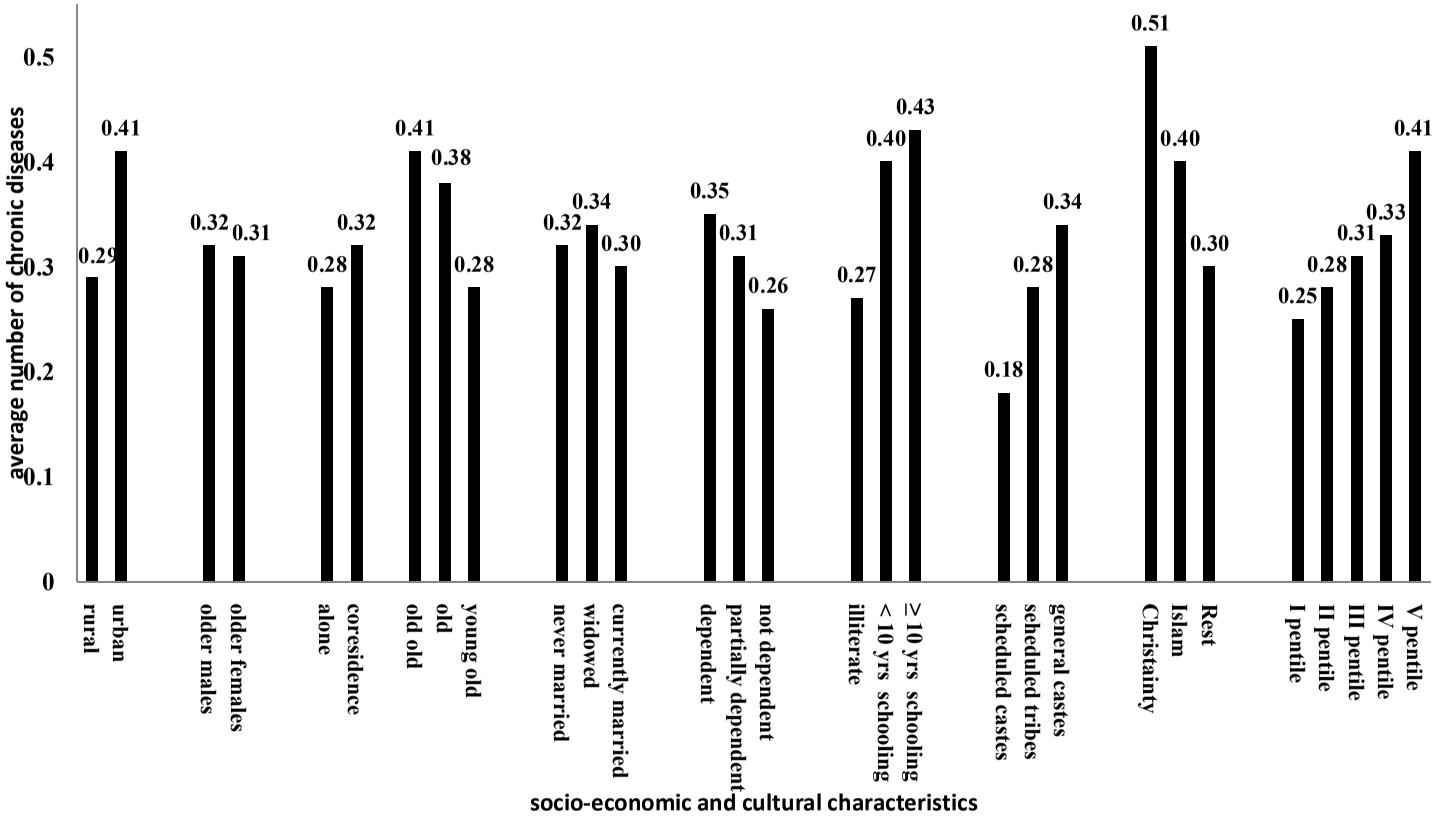


**Figure 3: average number of chronic diseases reported by various socio-economic and cultural characteristics of the older adults**

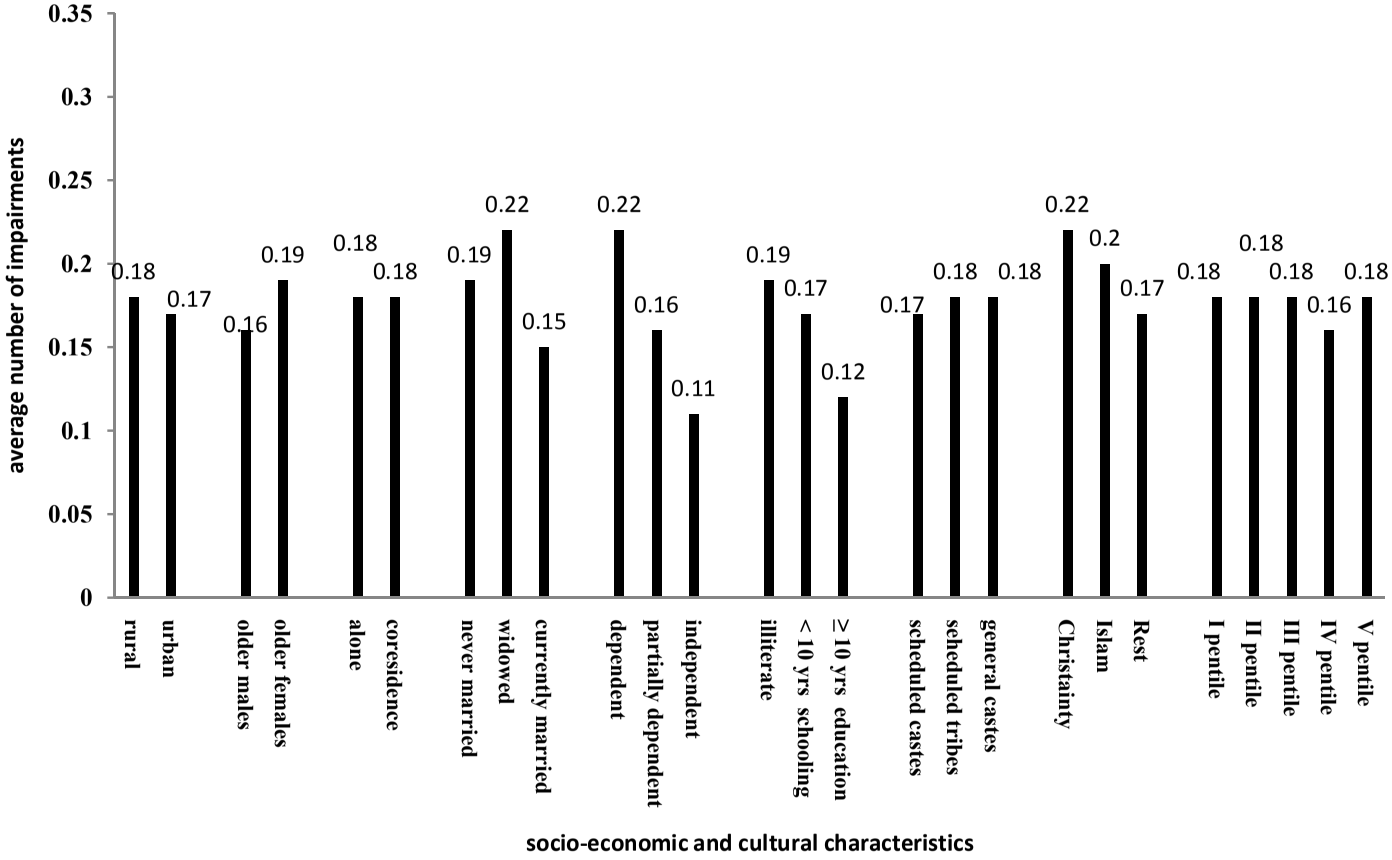


**Figure 4: average number of impairments reported by various socio-economic and cultural characteristics of the older adults**

**Table 1: Characteristics of the sample by gender (expressed as a percentage of the total frequency)**

| | older males | older females |
|---|---|---|
| *sample size* | 14918 | 14178 |
| *marital status* | | |
| never married /divorced /separated | 0.7 | 0.8 |
| widowed | 17.7 | 59.2 |
| currently married | 81.6 | 40.8 |
| *financial dependence* | | |
| dependent | 32.0 | 74.2 |
| partially dependent | 15.5 | 11.8 |
| independent | 52.5 | 14.0 |
| *level of education* | | |
| illiterate | 50.4 | 81.3 |
| less than ten years of schooling | 35.9 | 15.5 |
| ten or more years of education | 13.8 | 3.2 |
| *living arrangements* | | |
| alone | 16.9 | 15.3 |
| co-residence | 83.1 | 84.7 |
| *place of residence* | | |
| rural | 76.5 | 75.1 |
| urban | 23.3 | 24.9 |
| *caste* | | |
| scheduled tribes | 6.6 | 6.2 |
| scheduled caste | 17.5 | 17.1 |
| general castes | 75.9 | 76.7 |
| *religion* | | |
| Christianity | 2.5 | 2.8 |
| Islam | 9.5 | 9.3 |
| rest | 88.0 | 87.9 |

**Table 2: Parameter estimates for Poisson regression of the burden of chronic diseases for the older adults in India**

| variables | model - I | | | model - II | | |
|---|---|---|---|---|---|---|
| | effect (b) (p-value) | $e^b$ | 95% C.I. for $e^b$ | effect (b) (p-value) | $e^b$ | 95% C.I. for $e^b$ |
| intercept | -3.17(0.00) | 0.04 | (0.03, 0.05) | -2.27 (0.00) | 0.10 | (0.08, 0.13) |
| age | 0.03(0.00) | 1.03 | (1.03, 1.03) | 0.02(0.00) | 1.02 | (1.02,1.02) |
| *gender* | | | | | | |
| male | | | | 0.09(0.00) | 1.09 | (1.04, 1.15) |
| female® | | | | | | |
| *marital status* | | | | | | |
| never married / divorced / separated | | | | 0.02(0.90) | 1.02 | (0.80, 1.30) |
| widowed | | | | 0.08(0.00) | 1.08 | (1.03, 1.14) |
| currently married® | | | | | | |
| *financial dependence* | | | | | | |
| dependent | | | | 0.41(0.00) | 1.50 | (1.42, 1.59) |
| partially dependent | | | | 0.25(0.00) | 1.29 | (1.20, 1.38) |
| independent® | | | | | | |
| *level of education* | | | | | | |
| illiterate | | | | -0.37(0.00) | 0.69 | (0.64,0.76) |
| less than ten years of schooling | | | | -0.05(0.20) | 0.95 | (0.88,1.03) |
| ten or more years of education® | | | | | | |
| *living Arrangements* | | | | | | |
| alone | | | | -0.08(0.02) | 0.93 | (0.87,0.99) |
| co-residence® | | | | | | |
| *household economic condition* | | | | | | |
| first quintile | | | | -0.44(0.00) | 0.64 | (0.60,0.69) |
| second quintile | | | | -0.31(0.00) | 0.73 | (0.68,0.78) |
| third quintile | | | | -0.23(0.00) | 0.80 | (0.75,0.85) |
| fourth quintile | | | | -0.16(0.00) | 0.85 | (0.80,0.91) |
| fifth quintile® | | | | | | |
| *place of residence* | | | | | | |
| rural | | | | -0.23(0.00) | 0.79 | (0.75,0.84) |
| urban® | | | | | | |
| *caste* | | | | | | |
| scheduled tribes | | | | -0.33(0.00) | 0.72 | (0.64,0.81) |
| scheduled caste | | | | 0.03(0.39) | 1.03 | (0.97,1.09) |
| general castes® | | | | | | |
| religion | | | | | | |
| Christianity | | | | 0.30(0.00) | 1.35 | (1.22,1.51) |
| Islam | | | | 0.32(0.00) | 1.37 | (1.28,1.47) |
| rest ® | | | | | | |
| Model $\chi^2$ (d.f.) | | | 325.25 (1) | | | 1302.44 (18) |
| (p-value) | | | (0.00) | | | (0.00) |
| Deviance $R^2$ | | | 0.01 | | | 0.05 |

®denotes the reference category

**Table 3: Parameter estimates for Poisson regression of the burden of impairments for the older adults in India**

| variables | model - I | | | model - II | | |
|---|---|---|---|---|---|---|
| | effect (b) (p-value) | $e^b$ | 95% C.I. for $e^b$ | effect (b) (p-value) | $e^b$ | 95% C.I. for $e^b$ |
| intercept | -4.98(0.00) | 0.01 | (0.01, 0.01) | -5.12(0.00) | 0.01 | (0.00, 0.01) |
| age | 0.05(0.00) | 1.05 | (1.04, 1.05) | 0.04(0.00) | 1.04 | (1.04, 1.05) |
| *gender* | | | | | | |
| male | | | | 0.05(0.17) | 1.05 | (0.98, 1.13) |
| female® | | | | | | |
| *marital status* | | | | | | |
| never married / divorced / separated | | | | 0.03(0.84) | 1.03 | (0.74, 1.44) |
| widowed | | | | 0.18(0.00) | 1.19 | (1.12, 1.27) |
| currently married® | | | | | | |
| *financial dependence* | | | | | | |
| dependent | | | | 0.50(0.00) | 1.65 | (1.52, 1.79) |
| partially dependent | | | | 0.31(0.00) | 1.36 | (1.23, 1.51) |
| independent® | | | | | | |
| *level of education* | | | | | | |
| illiterate | | | | 0.20(0.01) | 1.23 | (1.06, 1.42) |
| less than ten years of schooling | | | | 0.21(0.00) | 1.23 | (1.07, 1.42) |
| ten or more years of education® | | | | | | |
| *living Arrangements* | | | | | | |
| alone | | | | 0.23(0.00) | 1.26 | (1.17, 1.37) |
| co-residence® | | | | | | |
| *household economic condition* | | | | | | |
| first quintile | | | | -0.07(0.15) | 0.93 | (0.85, 1.03) |
| second quintile | | | | -0.05(0.34) | 0.96 | (0.87, 1.05) |
| third quintile | | | | -0.01(0.87) | 0.99 | (0.91, 1.08) |
| fourth quintile | | | | -0.10(0.03) | 0.90 | (0.82, 0.99) |
| fifth quintile® | | | | | | |
| *place of residence* | | | | | | |
| rural | | | | 0.03(0.44) | 1.03 | (0.96, 1.11) |
| urban® | | | | | | |
| *caste* | | | | | | |
| scheduled tribes | | | | 0.02(0.72) | 1.02 | (0.90, 1.16) |
| scheduled caste | | | | 0.02(0.55) | 1.03 | (0.95, 1.11) |
| general castes® | | | | | | |
| religion | | | | | | |
| Christianity | | | | 0.16(0.06) | 1.17 | (1.00, 1.38) |
| Islam | | | | 0.12(0.02) | 1.13 | (1.02, 1.25) |
| rest ® | | | | | | |
| Model $\chi^2$ (d.f.) | | | 490.61(1) | | | 784.04(18) |
| (p-value) | | | (0.00) | | | (0.00) |
| Deviance $R^2$ | | | 0.03 | | | 0.04 |

®denotes the reference category