Is health status of elderly worsening in India:A comparison of successive rounds of National Sample Survey data

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Abstract

The increasing graying of India's population raises concerns about the welfare and health status of the aged. One important source of information of health status of the elderly is the National Sample Survey Rounds on Morbidity and Health Care Expenditure. Using unit level data for 1995-96 and 2004 this paper has examined changes in reported health status of elderly in India and analyzed their relationship with living arrangements and extent of economic dependency. It appears that even after controlling for factors like caste, education, age, economic status and place of residence, there has been deterioration in self-perceived current health status of elderly. This paper argues that, although there have been changes in the economic condition and traditional living arrangements - with a decline in co-residential arrangements - this is not enough to explain the decline in reported health status and calls for a closer look at narratives of neglect being voiced in developing countries.

Keywords: Economic independence, Co-residence, Elderly, Health status, Ordered logit model, India.

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1. Introduction

The sharp dip in fertility rates in recent years, combined with falling mortality rates over the last four decades, is leading to an increase in the absolute and relative size of elderly population in the developing countries (Rajan, Mishra and Sarma, 2003). Population projections indicate an increasing graying of the world's population, with the share of persons aged 60 years and above increasing from 9.5 percent in 1995 to 30.5 percent in 2150 (United Nations, 2005). The growth rate of the elderly population varies between countries, but is expected to be high in Afro-Asian countries. In India, for instance, the share of aged has increased from 6.5 percent (1981) to 7.4 percent (2001), and is expected to constitute about a fourth of the population by 2075. Although some researchers argue that the increase in the elderly population merely comprises a change in dependency structure, and resources freed from a reduction in share of young should suffice to take care of the elderly (Ball and Bethel, 1998), the issue is more complex, particularly in developing countries, and goes beyond looking after their special needs with respect to health care, housing and financial insecurity (Nyce and Schieber, 2005). In these countries, as Palloni (2005) points out, aging of the population is occurring in economic, social and political contexts that are often fragile and precarious.

The last two decades have witnessed a significant transition of the Indian economy and society having crucial implications for elderly care. Changes like integration of the

economy with global markets and liberalization have created new economic opportunities for the population at large. At the same time, growing economic inequality, urbanization, modernization, increasing individualism and consumerism, women's increasing participation in paid work and greater mobility of population has led to disintegration of the traditional extended families to nuclear families in India. This has resulted in economic dependence during old age on one hand and reduced family support to the elderly on the other. Studies (Planning Commission, 2001; Rajan and Kumar, 2003; Visaria, 2001) have demonstrated how the reduced family support has resulted in the elderly having to live a marginal and precarious existence.

At the same time, the Government of India initiated a number of social welfare programmes and policies during the same period. For example, legislative activity at both the state and national levels for the very poor elderly occurred during middle and late 1990s, accompanied by growing advocacy for a national policy on ageing (Gokhale, 2003). The National Social Assistance Programme (1995) made the first attempt to provide a social security network to the elderly through the provisioning of, inter alia, a pension scheme for the elderly destitute. The National Policy on Older Persons (1999) is another major step forward in this regards. Intervention areas include financial security, health care, shelter, welfare, and other needs of elders; protection against abuse and exploitation; opportunities for developing the potential and participation of elders; and services to improve quality of life of elders. The concept of healthy aging enunciated in this policy was further reiterated in the National Population Policy of 2000. However, institutional response – in the form of developing social health care and security

mechanism, old age homes, and other necessary steps - to the problem of aging has not been effective and remains inadequate and more in the nature of lip service (Bose and Shankardass, 2004; Rajan et al., 1999).

Consequently, given problems like high levels of morbidity (Alam, 2006; Rajan et al., 1999; World Bank, 1993) and commensurately high health care expenses (Nye and Schieber, 2005), well being of the elderly may have been threatened. In particular, the impact of economic independence and living arrangements on well being and health status of the elderly is an area that has generated considerable interest among researchers The effect of economic independence on quality of life of the aged was examined by Rajan and Kumar (2003), while the relationship between old age poverty, chronic ailments and lack of functional autonomy among elderly were studied by Alam and Mukherjee (2005) and Albert, Alam and Nizamuddin (2005). Rajan and Kumar (2003) have addressed the issue of living arrangement among Indian elderly and argued that restoring familial care of the elderly is much needed in the wake of modernization. Surveys conducted in other South-east Asian countries found that children continue to be an important source of support to the elderly (Arifin, 2006; Chan 1997; Knodel and Debavalya, 1997; Natividad and Cruz, 1997; Sobieszczyk et al., 2002). Recently - using 60^{th} round of National Sample Survey Organization (NSSO), 2004, data - Ghosh and Husain (2010) have examined the effect of economic independence and living arrangement on perceived health status among elderly in India. In addition, there were other studies focusing on the prevalence of morbidity among elderly, their socioeconomic

correlates and availability of health facilities (Alam, 2006; Kumar, 1996, 1999, 2003; Rajan, 2006), and on social security aspects (Kumar, 2003; Subrahmanya, 2005).

Using disability and chronic ailment as a proxy for health status, Gupta and Sankar (2003) have found that economic condition and living arrangements influence the reporting of physical vulnerability among aged in India. In a recent study, Mini (2009) had assessed the contribution of different factors to the overall health status (measured by combining self-perceived health status, physical mobility and presence of any disease) among the elderly population of Kerala and concluded that while women report less morbidity, perceived well-being and physical mobility were better for men. Alam (2008) found that caste, widowhood and public health measures were major determinants of health status among rural elderly. However, these studies have focused on a single point of time, using either primary surveys or data from any one of the National Sample Survey (NSS) 52nd and 60th rounds (relating to 1994-95 and 2004, respectively).

The present study pools data from these two surveys, enabling us to introduce the impact of time into the picture and analyze the *change* in perceived health status of the elderly in India over a decadal period. This paper attempts to examine the impact of economic independence and living arrangements on the perceived health status of the elderly in India after controlling for a number of other demographic and socio-economic characteristics, and time. Moreover, the study argues the need to take into account differences between rural and urban sectors and between the sexes.

2. Materials and Methods

The NSSO has conducted two waves of surveys on morbidity and healthcare that contain information on the health status of the elderly (aged 60 years and above) – the 52nd Round (July 1995 to June 1996) and the 60th Round (January to July 2004). The sample was selected using a two-stage stratified design, with census villages and urban blocks as the first-stage units (FSUs) for the rural and urban areas respectively, and households as the second-stage units (SSUs). A total of 194,810 households (120,942 in the 52nd Round and 73,868 in the 60th Round) were surveyed. These two datasets were merged taking variables that were common to both rounds, and data for elderly extracted. Information pertaining to a total of 68,852 persons was extracted, of which 49.4 percent was from the 52nd Round and the remaining from the 60th Round. The final merged data set contained information on self-reported health indicators, basic demographic features (age, gender, caste, marital status, educational level, household size, place of residence, state of residence), economic characteristics (like household expenditure, occupation, usual activity status), and information on living arrangements and economic independence.

The present paper uses perceived health status in order to asses the change in health condition at two points of time. NSSO provides information on three indicators of health status – mobility (responses to the question "Whether physically immobile" respondents were categorized on a three point scale – 'Confined to bed', 'Confined to home' and 'Not Immobile'), perceived current health status (grouping responses to 'What is your own perception about current state of health?' using a three point scale - 'Excellent/Very good', 'Good/Fair' and 'Poor') and perceived improvement in state of health (NSSO also

seeks information about whether there has been an improvement in health status relative to the past year; the responses are coded on a five point scale). This paper uses perceived current health status as an indicator of health status.

Use of self-reported health status may be questioned, particularly as it is subjective (Gupta and Sankar, 2003). Self-reporting may also be shaped by the social context in which the person is situated (Sen, 1993). However, there is a large volume of literature suggesting that self-reported health is an acceptable indicator of general health with good construct validity (Manton et al., 1997; Smith, 1994; Soldo and Hill, 1995; Wallace, 1995), and a powerful predictor of mortality risks (Idler and Benyamini, 1997), disability (Idler and Kasl, 1995), and morbidity (Beckett et al., 2000; Schechter et al., 1998). A medical study in Bangladesh also finds strong correspondence between self-reported health and actual physical measures of health (Rahman and Barsky, 2003).

The consistency of response has also been verified by comparing self-reported current health status with mobility of the respondent from pooled dataset. It was observed that only 1.7 percent of immobile respondents report themselves to be in excellent health while the majority (82.9 percent) feel that they are in poor health. Similarly, most of the physically mobile persons report themselves to be in either good health (75 percent) or excellent health (8 percent). This indicates that self-reported current health status is an acceptable indicator and can be used in the present analysis.

The response to state of current health status has been coded into three categories – Poor, Good/Fair and Excellent. Researchers like Gupta and Sankar (2003) and Mini (2009) have converted this three-fold classification to a binary form and used a binary logit model. This results in loss of information on the health status of respondent. Since the response variable has more than two levels (polychotomous) and is ordered ordinally, Ghosh and Husain (2010) suggest use of an ordered logit model.

Ordered logit model is a multi-equation model, with each equation resembling a logit model. The equations are estimated for the binary options (1, 2 to J), (1 to 2, 3 to J), (1 to 3, 4 to J) … of the response variable. Therefore, the number of equations is always one less than the number of categories of the dependent variable. Typically, the logistic regression models assumes that the coefficients of each of the explanatory variable included in the model are constant across all the categories of the response variable; that is, the different equations are parallel, only the intercept changes for each level of transition. This is known as the *assumption of proportional odds*. This assumption, however, is strong and should be tested (Brant, 1990). If the assumption is violated, the researcher should consider shifting to a variable parameter model (Williams, 2006). Here again, two possibilities should be considered (Long and Freese, 2006). One is to completely remove restrictions on parameters and allow all coefficients to vary. This results in a set of logistic equations. On the other hand, only some parameters (selected on the basis of the Brant test) may be allowed to vary, while others are held constant. The imposition of some restrictions results in the partial proportion odds model, as opposed to the (fully) variable parameters model without any restrictions. The justification and

validity of the additional restrictions may be tested using the Likelihood Ratio test (Williams, 2006) and the appropriate parsimonious model chosen. The computation of these tests is a methodological improvement over Ghosh and Husain's (2010) work mentioned earlier using an ordered model.

The main explanatory variables of the models are the economic independence, living arrangement and two time periods (1995-96 and 2004-5). The variable 'economic independence' has been categorized as not-dependent to any other family members, partially dependent to other family members and fully dependent to the other family members. Family support has been determined by the living arrangement (categorized as living with spouse, with spouse and others, with children but without spouse, and a residual category including living alone, in old age homes, with other relatives or with non-relatives). Control variables included in the models were gender, age, educational attainment, caste, activity status and per capita household expenditure. Expenditure levels in 1995-96 were converted to 2004 prices using wholesale price indices published by the Central Statistical Organisation. Respondents were classified into four groups based on their usual activity status - engaged in economic activities (activities producing goods and services for the market, which are incorporated within the national income of the country), extended System of National Accounts (SNA) activities (production activities, like subsistence production, falling outside the market realm, that are not incorporated within the national income of the country), unemployed but seeking work, and a residual category (comprising of rentiers, pensioners, remittance recipients, disabled, beggars, prostitutes, etc.). Given regional differences in level of overall development, available

health facilities, socio-cultural practices and family structures among regions, regional dummies were also incorporated into the models. The total sample was divided into six cultural/geographical regions - Central (reference category), North, North-East, East, West and South. Another dummy indicating the place of residence (rural and urban) was also incorporated. Marital status of the respondent was incorporated in the bivariate analysis but dropped in the multivariate models due its high correlation with 'living arrangement'.

1. Results

3.1 Sample characteristics between rounds

An examination of the sample profile between the two rounds revealed some variations. It has been observed that while economically fully dependant elderly comprise the majority of respondents (52 percent), the proportion of economic independent persons is also quite high (33 percent) and has increased in 2004 (by 4 percentage points). In conformity with the family structure observed in Asian countries, the majority of elderly (82 percent) reside with their children (with or without spouses); however, this proportion has declined over time (by 4 percentage points).

About half of both sub-samples are females. The proportion of 'young-old' (respondents aged between 60-69 years) constitutes about two-third of the respondents and increased by four percentage points between rounds. Currently married and widows/widowers comprise most of the sample.

In India, religious and social groups comprise an important category of analysis. As the 52nd Round does not provide information on religion, we have considered only social groups. The sample is divided into three groups - Scheduled Castes (15 percent), Scheduled Tribes (9 percent) and a residual group, Others (76 percent), comprising of Forward caste Hindus, and other religious groups. Scheduled Castes (SCs) are Hindus belonging by birth to the lowest of the four castes. They were formerly untouchables and, even now, are often economically and socially depressed. Scheduled Tribes (STs), on the other hand, are members of economically and socially depressed tribes (which may be non-Hindu also) who were also treated as untouchables. In post-Independence India, Articles 341 and 342 of the Constitution provides a list of all SCs and STs under The Constitution (Scheduled Castes) Order, 1950, and The Constitution (Scheduled Tribes) Order, 1950, respectively, to facilitate affirmative action targeting such social groups. The caste profile shows a marginal increase in SCs and STs over the study period. This may reflect a greater willingness to report their underprivileged social status to take advantage of the increased benefits provided by the Government to SCs and STs since the 1990s (GOI, 2006).

About 84 percent of the sample has primary education or even lower level of education. However, educational levels have increased, with an increase in the proportion of respondents with more than primary level education from 15 percent to 17 percent. A large proportion of the elderly are engaged either in economic or in extended-SNA activities, though the majority are in the residual category. There does not seem to be any significant changes in their activity status.

The sample has a higher proportion of rural residents (63 percent), with the proportion increasing over time by 2 percentage points. Respondents from the Central and the Southern states comprise the major part of the sample (33 and 24 percent, respectively). Regional variations in the samples may be observed over time. Representation from the Northern and the Western states has declined (both by two percentage points), while that of the Central, and the North-eastern states has increased (by 2.4 and 1.4 percentage points, respectively).

In addition to the above, mean and median per capita expenditure levels were also estimated. Mean of expenditure in 1995-96 and 2004 were Rs.437 and Rs.740, respectively; the corresponding figures for median were Rs.362 and Rs.571 (when an Indian Rupee is equal to about two US cents).

3.2 Self-perceived health status of elderly among different population sub-groups between rounds

Most of the respondents perceived a good state of health in both the rounds, varying from excellent (8 percent) to good (70 percent). About 22 percent of respondents, however, perceived poor health status. This proportion is not concerning, given their age profile. What is interesting is that the proportion of respondents reporting poor health status has increased over the study period by five percentage points.

Table 1a and 1b presents results of bivariate analysis between perceived health status and explanatory variables across the study period. It can be observed from Table 1a that there

has been a substantial increase in respondents reporting poor health status in almost all cases. Although percentage of persons reporting poor reported health status has increased among economically independent, partially dependant and fully dependant persons, the change in terms of percentage points between these categories is marginal. The increase is the highest among respondents who reside with non-relations and are unemployed. Health status has improved only among inmates of old age homes, possibly a result of improvement in their functioning, reflecting the growing societal concern for the elderly and increasing activism among NGOs and similar organizations. However, the decrease in proportion of inmates of such homes reporting excellent health over the study period indicates that there is still need for improvement in this regard.

Table 1a: Bivariate analysis of perceived current health status and explanatory variables in 52nd round (1995-96) and 60th round (2004) of NSSO

Predictor variables	1995-96			2004-05			Change : 1995-96 & 2004-05 (Percentage points)		
	Excellent	Good	Poor	Excellent	Good	Poor	Excellent	Good	Poor
Economic Independence									
Independent	15.2	77.1	7.7	9.3	76.7	14.1	-5.9	-0.4	6.3
Partially dependent	9.9	75.2	14.8	5.3	73.4	21.4	-4.6	-1.9	6.5
Fully dependent	6.7	66.9	26.4	3.1	64.2	32.7	-3.6	-2.7	6.3
Living Arrangement									
Alone & inmate of old age home	10.5	69.6	19.9	8.3	74.2	17.4	-2.2	4.7	-2.5
Not inmate of old age home	9.9	70.4	19.7	4.5	70.1	25.5	-5.4	-0.3	5.8
With spouse only	10.0	72.0	18.0	5.4	69.8	24.8	-4.6	-2.2	6.8
With spouse & others	11.6	72.5	15.9	6.9	72.2	20.9	-4.8	-0.3	5.1
Without spouse & with children	7.1	69.1	23.8	3.7	66.9	29.4	-3.4	-2.2	5.6
Other relation	8.7	66.9	24.4	4.7	63.8	31.5	-4.0	-3.1	7.1
Other non-Relation	18.1	64.5	17.4	7.5	58.2	34.3	-10.6	-6.3	16.9
Number of cases	**3319**	**23944**	**6758**	**1828**	**23137**	**8216**			

It can be seen from Table 1b that elderly males are more likely to report poor health than females. Compared to the 'young-elderly' (those aged between 60 to 69 years), 'middle aged elderly' (between 70-79 years) report a greater decline in excellent health; the 'old-

elderly' (aged 80 years or more) also report a decline in health status, but its magnitude is in between the two age groups. Elderly with living spouse, widows and widowers are more likely to report poor health status compared to never married respondents and divorcees. This may because the latter had planned financially and had prepared themselves psychologically in advance for old age and destitution. Analysis of reported self-perceived health by educational level reveals that the decline in reporting 'excellent' health is greater among those with 'middle' levels of education – secondary (10 years of schooling) and higher secondary (twelve years of schooling). This possibly implies that those with lower educational levels may be, in general, relatively less affluent (monthly per capita expenditure of the graduate elderly is Rs.1676, compared to Rs.1044 for those with Secondary and Higher secondary level education) and have relatively modest expectations compared to more educated elderly in terms of health status. Interestingly, graduates reporting poor health status have higher per capita expenditure levels than those reporting fair and excellent health.

There has also been a decline in economically active respondents reporting excellent health. This may reflect deteriorating working conditions over the study period. A substantial increase in unemployed respondents reporting poor health has also been observed.

Table 1b: Bivariate analysis of perceived current health status and control variables in 52nd round (1995-96) and 60th round (2004) of NSSO

Control Variables	1995-96			2004-05			Change : 1995-96 & 2004-05 (Percentage points)		
	Excellent	Good	Poor	Excellent	Good	Poor	Excellent	Good	Poor
Gender									
Male	11.4	71.1	17.5	7.0	70.0	23.0	-4.4	-1.1	5.5
Female	8.1	69.7	22.2	3.9	69.4	26.6	-4.1	-0.3	4.4
Age groups									
60-69 years	11.6	74.4	14.1	9.3	74.4	16.4	-2.3	0.0	2.3
70-79 years	7.3	67.3	25.4	5.3	66.0	28.8	-2.1	-1.3	3.3
Above 80 years	5.1	53.7	41.2	3.9	52.2	44.0	-1.3	-1.5	2.7
Marital status									
Never married	13.1	60.5	26.5	6.6	65.6	27.8	-6.4	5.1	1.3
Currently married	11.4	72.2	16.4	6.6	71.7	21.8	-4.9	-0.5	5.4
Widowed	7.1	68.2	24.7	3.8	66.9	29.3	-3.2	-1.4	4.6
Divorced/Separated	9.4	63.3	27.3	7.4	63.7	28.9	-2.0	0.4	1.6
Educational Level									
Below primary	8.4	69.7	21.9	4.3	68.7	27.0	-4.1	-1.0	5.1
Primary	11.1	71.9	17.1	7.0	70.6	22.4	-4.1	-1.3	5.3
Secondary or less	14.9	73.0	11.9	8.5	73.3	18.2	-6.4	0.3	6.2
Higher Secondary	16.8	74.8	8.4	11.3	72.3	16.4	-5.6	-2.5	8.0
Others	20.4	71.4	8.2	12.4	74.5	13.1	-8.0	3.1	4.9
Economic Activity									
Engaged in economic activity	13.8	77.1	9.1	8.8	78.2	13.0	-5.0	1.0	4.0
Unemployed	8.2	75.4	16.4	5.6	61.1	33.3	-2.6	-14.3	16.9
Engaged in extended SNA activity	9.7	75.7	14.7	4.5	75.8	19.7	-5.1	0.1	5.1
Others	6.8	62.6	30.6	3.7	60.8	35.5	-3.1	-1.8	4.9
Social Group									
Scheduled Tribe	11.4	68.5	20.1	7.8	72.9	19.3	-3.7	4.5	-0.8
Scheduled Castes	7.3	69.1	23.6	4.3	67.7	28.0	-3.0	-1.4	4.4
Others	10.0	70.9	19.1	5.5	69.8	24.7	-4.5	-1.1	5.6
Place of Residence									
Rural	8.5	69.3	22.2	4.9	68.5	26.6	-3.6	-0.8	4.3
Urban	11.8	72.2	16.0	6.6	71.9	21.6	-5.2	-0.3	5.6
Zones									
North	8.7	70.8	20.5	5.9	72.3	21.8	-2.9	1.6	*1.3*
Central	9.2	71.7	19.1	5.6	67.3	27.1	-3.6	-4.4	*8.0*
North-east	19.9	60.7	19.5	10.8	70.6	18.6	-9.1	9.9	*-0.8*
East	8.0	64.8	27.3	3.2	64.5	32.3	-4.8	-0.3	*5.0*
West	11.5	73.4	15.2	6.8	74.1	19.1	-4.7	0.7	*4.0*

Control Variables	1995-96			2004-05			Change : 1995-96 & 2004-05 (Percentage points)		
	Excellent	Good	Poor	Excellent	Good	Poor	Excellent	Good	Poor
South	8.6	71.9	19.4	4.6	72.4	23.1	-4.1	0.4	*3.6*
Number of cases	**3319**	**23944**	**6758**	**1828**	**23137**	**8216**			

Bivariate analysis of caste and perceived health status indicates a marked increase in reporting of 'poor' health status among the forward castes, followed by Scheduled castes. Contrary to expectation, Scheduled Tribes, expected to have least access to health facilities and government programmes, have registered a marginal improvement in perceived health status.

Elderly belong to urban areas are more likely to report poor health status in 2004 compared to 1995-96. Analysis by zones reveals that residents of Central India (comprising Bihar, Jharkhand, Uttarkhand, Uttar Pradesh, Chattisgarh, Madhya Pradesh and Rajsthan) have experienced the greatest decline in self-perceived health, followed by the aged living in Eastern states of West Bengal, Orissa and Assam. Residents of North-east India actually report an improvement in self-perceived health status while the decline in good reported health status among the elderly living in Southern states of Andhra Pradesh, Kerala, Tamil Nadu and Karnataka is marginal.

3.3 Econometric analysis of all-India sample

As mentioned previously, an ordered logit is used to identify determinants of self-perceived health status of the elderly in India. The χ^2 statistic for the Brant test (507.86, p=0.00) indicates that the proportional odds assumption is invalid. Two variants of the ordered logit model are considered. The likelihood ratio (LR) test statistic between the

partial proportional odds model and the variable parameter model is 122.31 (0.00). This indicates that the assumption of even the partial proportion odds assumption is too restrictive, so that the variable parameter model is appropriate. Results of this model are stated in Table 2.

Table 2: Results of generalized ordered variable parameters logit model, 52nd round (1995-96) and 60th round (2004) of NSSO

Observations = 66138 LR χ 2 (44) = 9384.90 (p=0.00) Pseudo R^2 = 0.092

Exploratory variables	Poor health vs Good health		Good health vs Excellent health	
	Odds ratio	z	Odds ratio	z
Economic independence				
Partly dependant (RC)	1.00		1.00	
Independent	1.50	11.18**	1.46	8.38**
Fully dependant	0.73	-9.60**	0.85	-3.21**
Living arrangements				
With spouse and children (RC)	1.00		1.00	
With spouse only	0.69	-10.13**	0.78	-4.62**
With children but without spouse	1.01	0.51	0.88	-3.39**
Other arrangements	0.83	-5.04**	0.96	-0.68
Gender				
Female	1.06	2.1**	0.96	-1.00
Age groups				
Age group 70-79 years (RC)	1.00		1.00	
Age group 60-69 years	1.58	20.00**	1.53	10.90**
Age group 80 years and above	0.63	-13.99**	0.91	-1.20
Educational level	1.07	9.15**	1.10	10.10**
Economic activity				
Unemployed (RC)	1.00		1.00	
Engaged in economic activities	2.00	2.34**	1.88	1.46
Engaged in extended-SNA activities	1.73	1.84**	1.72	1.25
Other activities	0.77	-0.88	1.16	0.33
Log of adjusted per capita expenditure	1.16	6.16**	1.16	4.36**
Caste				
Others (RC)	1.00		1.00	
ST	1.17	3.93**	0.98	-0.30
SC	0.88	-4.39**	0.88	-2.72**
Place of residence				

Exploratory variables	Poor health vs Good health		Good health vs Excellent health	
	Odds ratio	z	Odds ratio	z
Urban	1.32	11.27**	1.22	5.60**
Zone				
Central (RC)	1.00		1.00	
North	1.13	3.28**	0.92	-1.47

Note:
RC: Reference category
Significance at 5% and 10% levels are indicated by * and **, respectively.

As expected, economically dependent elderly are more likely to report poor perceived health status compared to their independent counterparts. Results of the ordered logit model (Table 2) also indicate that residence in intergenerational households improves perception of health status positively. Persons engaged in economic activities or extended SNA-activities are also more likely to report fair or excellent health status. In fact, odd ratios of these two groups are higher than for all other variables.

Females are found to be more likely to report fair health, and are as likely as males to report themselves to be in excellent health. STs are more likely to report themselves to be in fair health while SC members report poorer health status, than non-SC or ST members. Both results are somewhat surprising as deserves a closer look. Among other control variables age, educational attainment and household per capita expenditure are found to have significant positive relationship with perceived health status.

It has also been observed that the urban residents are more likely to report themselves to be in fair or excellent health. This possibly reflects better access to health care facilities. Moreover, econometric analysis reveals that elderly people living in the Western and the North-Eastern India are more likely to report themselves to be in fair or excellent health

than those residing in the Central India. In contrast respondents from the Eastern states report themselves to be worse-off. Respondents from both North and South India are more likely to report themselves to be in fair health. However, while the probability of a North Indian reporting excellent health is the same as a Central Indian, a South Indian is less likely to report excellent health.

Finally, the impact of the time dummy needs to be discussed. It had been seen earlier that self-reported health status had deteriorated over the study period. Econometric analysis shows that this holds even after controlling for changes in socio-economic characteristics. A person is 33 percent less likely to report fair health and 49 percent less likely to report excellent health in 2004 than in 1995-96.

3.4 Econometric analysis by sex and place of residence

This section presents estimates of the appropriate ordered logit model for the four major population groups – urban males, urban females, rural males and rural females. It can be seen that these results are similar to the one obtained for the entire sample. What is interesting to analyze is the change in odds ratio for the time dummy.

Table 3: Results of ordered logit model by sex and place of residence, 52nd round (1995-96) and 60th round (2004) of NSSO

Variables	Urban male		Urban female		Rural male		Rural female	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Economic independence								
Partially dependent (RC)	1.00		1.00		1.00		1.00	
Independent	1.52**	1.30**	1.39**		1.64**	1.60**	1.15*	1.35**
Fully dependent	0.68**	0.69**	0.95		0.63**	0.69**	0.77**	0.89
Living arrangement								
With spouse & children (RC)	1.00		1.00		1.00		1.00	

Variables	Urban male		Urban female		Rural male		Rural female	
	Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
With spouse	0.72**	0.91	0.67**	0.94	0.65**	0.70**	0.73**	0.64**
With children only	1.18**	0.83*	0.88**	0.88**	1.13**	0.86*	0.98	0.86**
Other cases	0.77**	1.31**	0.87*	0.87*	0.94	1.03	0.79**	0.85
Age groups								
Age 70-79 (RC)	1.00		1.00			1.00		1.00
Age 60-69	1.68**	1.43**	1.50**		1.39**	1.61**	1.72**	1.63**
Age 80+	0.69**	0.97	0.57**	1.08	0.63**	0.89	0.64**	0.86
Educational level	1.11**	1.12**	1.04**	1.06**	1.05**	1.09**	1.01	1.06*
Economic activity								
Unemployed (RC)	1.00		1.00		1.00		1.00	
Eng. in econ act.	2.14	1.32	2.22**		1.11	3.22	3.14**	1.55
Eng. in extended SNA act.	1.81	1.05	2.15**	1.63**	0.76	3.15	2.49*	1.34
Others	1.02	0.91	NA	NA	0.43	2.04	1.12	0.94
Log of adjusted per capita expenditure	1.14**	1.02	1.24**		1.07	1.26**	1.19**	1.26**
Caste								
Others (RC)	1.00		1.00			1.00		1.00
ST	1.15	0.77*	1.11		1.07	1.12	1.25**	0.93
SC	1.06	0.77**	0.90		0.88**	0.95	0.85**	0.85*
Zone								
Central (RC)	1.00		1.00			1.00		1.00
North	1.14	1.15	1.09		1.25**	0.94	1.06	0.62**
North-east	1.18	2.42**	1.09	2.52**	1.35**	1.95**	1.07	1.95**
East	0.78**	0.71**	0.65**		0.75**	0.76**	0.62**	0.68**
West	1.40**	1.49**	1.32**		1.59**	1.03	1.40**	0.82*
South	1.35**	0.93	1.29**	0.94	1.15**	0.70**	1.09*	0.90
Time								
Time: 1995-96 (RC)	1.00		1.00		1.00		1.00	
Time: 2004-05	0.57**	0.55**	0.61**	0.42**	0.69**	0.57**	0.73**	0.46**

Note:
RC: Reference category
Significance at 5% and 10% levels are indicated by * and **, respectively.

It can be seen that the odd ratio for the time dummy is less than unity (indicating a negative relationship with reported health status) for all sub-samples. In the case of Model 1 (Poor health vs Fair Health) the odds ratio of time is the lowest for urban males

and females, respectively. This implies that the deterioration in health status between 1995-96 and 2004 is the highest in urban areas. Given better access to health facilities and greater activism of NGOs in urban areas this result is surprising. The odd ratio in the case of the Model 2 (fair versus excellent health) is lowest for urban females, closely followed by rural females; although the odd ratio is the highest for rural males, difference between males is marginal. Overall, therefore, *urban females seem to be the most vulnerable section of the population compared to others.*

4. Discussion

Based upon the nationally representative data collected during 1995-96 and 2004 by NSSO, India, during its 52nd and 60th round surveys respectively on 'Morbidity, Health Care and Condition of Aged', the present study provides changes in demographic and socioeconomic conditions in the self-perceived health status of the elderly population in India over a decade.

'Self-reported health status' has been used as a response variable in the present study. Several earlier studies have shown that self-reported health among elderly adults is a valid measure of the respondent's objective health status, an important predictor of survival in old age and a strong predictor of healthy longevity, even after controlling a number of factors associated with mortality, morbidity and disability (Jagger et al., 1993; McCallum et al., 1994; Lee, 2000; Ghosh and Husain, 2010).

An important result of this analysis is that perceived health status of elderly has declined. Further, this decline is observed even after controlling for socio-economic characteristics. Although works on elderly in India have emphasized their poor health status, such studies have not considered *changes* in the reported or actual health status over time. However, there has been a secular improvement in health facilities and greater acknowledgement of societal responsibility towards the elderly. The Government has introduced welfare schemes targeting senior citizens (like *Annapoorna*, *Antodaya*, National Social Old Age Pension, etc.), provided benefits to the elderly (lower train fares, higher exemption limits under income tax, etc.) and introduced legislation in the form of The Maintenance and Protection of Parents and Senior Citizens Act. Moreover, there has been increasing levels of activism by NGOs providing economic security and health care to the elderly. Given these steps, our finding is not expected. The reason for the deterioration in reported health status, in spite of this, needs closer look and may comprise an area for future research.

In line with existing studies (Alam, 2008; Chou and Chi, 2002; Gupta and Sankar, 2003; Mini, 2009; Rajan, 2006; Ghosh and Husain, 2010), age, educational attainment and household per capita expenditure are found to have a significant positive relationship with perceived health status

Our findings contrast with findings by other researchers observing females to report poorer health status than males (Gupta and Sankar, 2003; Rajan, 2006; Mini, 2009; Ghosh and Husain, 2010). Sen (2006), however, warns that social influences that may reduce expectations and keep a person content in situations that appear unsatisfactory to

others - “the malleability of mental attitudes … may tend to hide and muffle the extent of deprivation in many cases” (Sen, 2006: 387). In this context, Sen (1985, 1993) cites a study by Lall and Seal (1949) during the Great Bengali famine of the 1940s reporting that 48.5 percent of widowers feel themselves to possess poor health status, as compared to 2.5 percent of widows. Sen (1993) also refers to the poorer self-reported health conditions reported in Kerala (having developed health and education) compared to states like Bihar and Uttar Pradesh with poor health infrastructure.

SCs are at relatively less disadvantageous position in terms of education and economic status in Indian social strata, compared to STs. Hence, the finding that STs are more likely to report fair health than SCs is somewhat surprising, though not entirely consistent with other works (Alam, 2008). This finding may also be explained in terms social conditioning of perceptions referred to earlier (Sen, 1993, 2006). STs have lower expectations and are content with lower actual health status. In contrast, SCs - who have benefited more from affirmative action (GOI, 2006) - have higher expectations, so that they are dissatisfied with a health status better than that of STs.

From the present study it may be argued that economic conditions appeared to be the crucial factor for the elderly across the world as it underlay all other determinants of living conditions and health status. This reconfirms findings of earlier studies (Guilmoto and Rajan, 2002; Rajan and Kumar, 2003; Gupta and Sankar, 2003; Mini 2009; Alam, 2008; Ghosh and Husain, 2010). This is important as about 52 percent of the elderly are completely dependent on their relatives. The lack of savings and economic vulnerability

of the aged in India is also confirmed by the finding that 60 percent of female elderly and 30 percent of male elderly in India do not possess any valuable assets, and that about 10 percent of rural elderly faced difficulties in accessing one of three basic needs such as food, clothing and medicine (Rajan, 2006).

The economic vulnerability of the elderly is particularly important given the high proportion of ailing persons (PAP) among the aged. NSS (2006) reports, for instance, PAP to be 30 percent among elderly in India. The report also estimates that 40 percent of the ailing persons were suffering from visual, locomotive, auditory or vocal disability, while a significant proportion was suffering from chronic diseases. For instance, about 20 percent of them were suffering from cardio-vascular diseases, 15 percent with cough (including tuberculosis of lung, asthma, bronchitis and whooping cough) and 9 percent with diabetes. Along with day-to-day living expenses, treatment of these diseases requires prolonged medication. This reduces their purchasing power since familial transfers may not be sufficient in many cases to meet all these expenses. This is aggravated by the deceleration in productive employment and growing casualization of labour market (Alam and Karim, 2006). Moreover, Alam (2008) has found that if consumption is taken as a close proxy for income, the internationally accepted one-dollar poverty norm appears to be a distant dream for many of the rural households with the co-residing elderly. All these evidences indicate the extent of economic vulnerability and marginalization of the aged in India and calls for multi-pronged strategies and programmatic considerations.

Given the economic vulnerability of the elderly, residential arrangements may constitute an important source of security. Sen and Noon (2007) have observed that residence in intergenerational households seem to provide protection from falling sick with short term illnesses. Similar findings were also reported by Gupta and Sankar (2003). The importance of residing in inter-generational households is also underlined by our study.

Many researchers have argued on aging in India that the influx of Western attitudes and culture, increasing work pressure on the working class, and similar processes associated with the integration of Indian economy and society with Western economies has led to a substantial reduction in co-residential arrangements and interaction between elderly parents and children (Alam, 2006; Bali, 1999; Bose and Shankardass, 2004; Rajan et al., 1997). The increasing conflict between generations has led to an increasing preference among even the elderly to live apart from their offspring, though maintaining ties with them. An increasing proportion of the aged are thus found to be residing in nuclear families, with their spouses, rather than in inter-generational households. Further, studies have also showed that work pressure and physical strain on the children, coupled with rising costs of living intensifying competition for scarce family resources, adversely affects relations between the elderly and their family members (Agewell Foundation, 2010). Such trends are marked in urban areas where the forces of urbanization and Westernization are more sweeping and where social isolation and lack of social networks is more common. In particular, the plight of elderly females appears to be most concerning. Starting from an initially disadvantaged position in a patriarchal society, the status of women deteriorates sharply as she looses her functional importance within the

family (Bagchi, 1997). Further, inter-generation conflict is often sharpest between the elderly female and her daughter-in-law. Lack of economic security, mobility and scope for social interaction increases her social isolation and vulnerability (Ghosh and Husain, 2010). In case of widows, their life is further disorganized by the emotional loss suffered and erosion of status within the family. Given this situation, the decline in reported health status found in the present study is not surprising.

However, the bleakness of these findings should be counterbalanced with the stability of co-residential arrangements (Palloni, 2001) - NSS data reveals that 84 percent of the aged still co-reside with their children in urban areas. The phenomenon of "living apart but together" (Sokolovsky, 2001) also shows how traditional living arrangements are adapting to structural and socio-economic changes (Gangrade, 1999). In such families, although co-residential arrangements have disintegrated, the joint family persists as a functional unit with the family drawing closer during crisis (Nayyar, 1999). In addition, factors like the altruistic caring of parents by children (Alam, 2006), media campaigns attempting to sensitize society and institutions to the needs and concerns of the elderly (a recent advertisement by a fast food company, for instance, shows children relieving the social isolation of their aged neighbors by sharing a pizza with them), increasing activism of the civil society and various institutions (like the judiciary), and introduction of government policies referred to earlier seeking to provide economic, social and emotional security to the aged are also important.

This raises questions about the 'discourses of neglect' being heard in developing countries. As pointed out by Sokolovsky (2001), these discourses are, in part, narratives of caution. To some extent, also, these may be the result of the activism of civil society providing a new platform where these discourses can be voices and increasing awareness of ones rights and society's duties. To what extent, therefore, the decline in reported health status is a result of actual changes in the predictor variables, and to what extent it is the result of changes in subjective evaluation of one's welfare is an important question that needs exploring.

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Appendix Tables

Table A.1: Results of Brant Test

Variable	χ^2	**p>** χ^2	**df**
All	507.87	0	22
Coefficients			
Not dependent	0.13	0.72	1
Fully dependant	7.17	0.01	1
With spouse only	3.99	0.05	1
With children but without spouse	10.96	0.00	1
Other arrangements	5.14	0.02	1
Female	4.72	0.03	1
Age group 60-69 years	0.49	0.48	1
Age group 80 years and above	20.37	0.00	1
Educational level	5.8	0.02	1
Engaged in economic activities	0.03	0.87	1
Engaged in extended-SNA activities	0	0.98	1
Other activities	0.62	0.43	1
Log of adjusted per capita expenditure	0.02	0.89	1
ST	6.78	0.01	1
SC	0.02	0.88	1
Urban	3.1	0.08	1
North	11.08	0.00	1
North-east	68.95	0.00	1
East	1.14	0.29	1
West	15.76	0.00	1
South	49.51	0.00	1
Year = 2004-05	58.52	0.00	1

Table A.2: Results of Logit Models for 1995-96 and 2004-05

Variables	Year = 1995-96			Year = 2004		
	Odds ratio	z	P>|z|	Odds ratio	z	P>|z|
Economic independence						
Partially dependent (RC)	1.00			1.00		
Not dependent	0.69	-6.56	0.00	0.66	-5.28	0.00
Fully dependant	1.17	2.58	0.01	1.22	2.29	0.02
Living arrangements						
With children and spouse (RC)	1.00			1.00		
With spouse only	1.23	2.91	0.00	1.36	3.77	0.00
With children but without spouse	1.19	3.62	0.00	1.07	0.95	0.34
Other arrangements	1.03	0.44	0.66	1.07	0.74	0.46
Gender						
Male	1.00			1.00		
Female	1.19	3.20	0.00	1.26	3.31	0.00
Educational level	0.91	-7.60	0.00	0.91	-6.42	0.00
Age group						
Age group 70-79 years	1.00			1.00		
Age group 60-69 years	0.73	-6.53	0.00	0.51	-9.45	0.00
Age group 80 years and above	1.15	1.54	0.12	1.00	0.01	0.99
Economic activity						
Unemployed (RC)	1.00			1.00		
Engaged in economic activities	0.51	-1.41	0.16	0.91	-0.09	0.93
Engaged in extended SNA activities	0.53	-1.31	0.19	1.06	0.05	0.96
Other activities	0.81	-0.45	0.65	1.53	0.41	0.68
Log of adjusted per capita expenditure	0.88	-2.70	0.01	0.82	-3.68	0.00
Caste						
Others (RC)	1.00			1.00		
ST	1.16	1.97	0.05	0.82	-2.24	0.03
SC	1.19	2.77	0.01	1.07	0.91	0.36
Place of residence						
Rural (RC)	1.00			1.00		
Urban	0.88	-2.25	0.02	0.88	-1.70	0.09
Zone						
Central (RC)	1.00			1.00		
North	0.98	-0.39	0.69	1.17	2.15	0.03
North-east	0.79	-5.12	0.00	0.86	-2.43	0.02
East	1.13	1.75	0.08	1.03	0.31	0.76
West	0.40	-11.64	0.00	0.60	-5.13	0.00
South	1.19	2.65	0.01	1.84	6.27	0.00

Variables	Year = 1995-96			Year = 2004		
	Odds ratio	z	P>|z|	Odds ratio	z	P>|z|
Pseudo R^2	**0.0542**			**0.0706**		
LR χ^2	**1152.37**			**990.88**		

Appendix: Ordered models

The basic idea underlying the ordered model is the presence of a continuous latent variable (y*) that can only be captured through the ordinal response variable (y). The latent variable can be related to the ordinal response variable using the following rule:

$y = i$ if $\tau_{i-1} <= y^* < \tau_i$ for $i = 1 \ldots J$

The structural model is:

$y^* = x\beta + \varepsilon$

The model can now be expressed in terms of probabilities:

$P(y=i|x) = P(\tau_{i-1} < y^* <= \tau_i |x)$

$P(y=i|x) = P(\tau_{i-1} < x\beta + \varepsilon <= \tau_i |x)$

$P(y=i|x) = P(\varepsilon < \tau_i - x\beta |x) - P(\varepsilon <= \tau_{i-1} - x\beta | x)$

$P(y=i|x) = F(\tau_i - x\beta) - F(\tau_{i-1} - x\beta)$

In terms of odds:

Odds $(y=k|x) = P(y <= k |x) / P(y > k |x)$

Ln (odds $(y=k|x) = \tau_k - x\beta$

The log likelihood function for ordered logistic regression is

$$\sum_{i=1}^{J}\sum_{j=1} \text{Ln}[F(\tau_j - X\beta) - F(\tau_{j-1} - X\beta)]$$

Its relevance to the current research problem is obvious – the actual health condition is a continuous latent variable that is captured through the reported health status (an ordinal categorical variable).