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## Understanding poverty among the elderly in India: implications for social pension policy

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## Understanding Poverty among the Elderly in India: Implications for Social Pension Policy

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April 2008

# Understanding Poverty among the Elderly in India: Implications for Social Pension Policy

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## ABSTRACT

### **Understanding Poverty among the Elderly in India: Implications for Social Pension Policy<sup>\*</sup>**

The Government of India is implementing a new policy which dramatically increases funding for a cash transfer program targeted to the poor elderly. The expansion of this 'social pension' in terms of coverage and benefit levels is taking place with little understanding of poverty among India's elderly or its determinants. This paper finds that households with elderly members do not have higher poverty rates than non-elderly households. This result is robust under various measures that take into account the size and composition of households. Separate evidence suggests that part of the explanation for this phenomenon is that the poor have higher mortality rates and are therefore underrepresented. This explanation has important implications for social pension policy and suggests that programs that reduce elderly mortality may actually increase the relative poverty levels of the elderly.

JEL Classification: J14, I31

Keywords: old age poverty, household demographic composition, adjusted poverty indices, elderly contribution, survivorship bias

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# Understanding Poverty among the Elderly in India: Implications for Social Pension Policy

## 1. Introduction

Cash transfers to the poor elderly or 'social pensions' are one of the most important anti-poverty programs operating today in India. In 2007, the Government of India announced that changes to eligibility rules would increase the number of beneficiaries from an estimated 8.7 to almost 16 million people or roughly one in five elderly Indians. Moreover, the benefit provided by the central government would be more than doubled from 75 to 200 rupees per month. State governments would be asked to provide an additional 200 bringing the total to about 8.5 per cent of the rural poverty line<sup>1</sup>

Despite the priority that has been given to this type of categorical targeting, little is known about poverty among the elderly or its determinants and thus the potential impact of this important program. This paper seeks to inform the policy discussion by calculating and analyzing poverty rates for the elderly in India. The analysis is primarily based on the fifty-second round (1995-96) National Sample Survey (NSS) household-level data from the rural sector of sixteen major Indian states. This survey is especially suitable for the analysis of old age poverty since it includes additional information on members of the household aged 60 or above (see Pal, 2007 for further description of the data). We also make use of the more recent 60<sup>th</sup> round (2004-05) NSS to update some of the results from the earlier survey. We focus on rural households where most of the poor elderly live and where there is generally very low coverage of contributory pension schemes.

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<sup>1</sup> Based on the adjusted 2004-05 rural poverty line. See Goyal and Palacios (2008).

This exercise updates the only previous study of old age poverty by Deaton and Paxson (1995) which was based on data for 1987-88 and covered six Indian states. Also, in order to arrive at more robust conclusions regarding poverty rates across demographic groups, we test for the sensitivity of the results to different plausible assumptions of adult equivalence and size economies in consumption.

The main conclusion of this analysis is that, with one important exception, there is no evidence that households with elderly members are more likely to be poor than non-elderly households. Although the result holds across states, there is variation that is suggestive of underlying demographic factors at work; in particular, a survivorship bias driven by higher mortality rates among the lifetime poor is detected. We test for this ‘survivorship bias’ in several ways (e.g., using various available data-sets) all of which support the hypothesis of higher mortality among the poor. The last section discusses the policy implications of this explanation of relative poverty rates, especially with regard to the provision of social pensions.

## **2. Old Age Poverty in the Indian States**

The 52<sup>nd</sup> round NSS provides a unique data-set for the analysis of elderly living conditions in the Indian states. It includes additional information on the elderly persons and contains information on their living arrangements, property/financial management and ownership etc. (for further details see Pal, 2004) that the usual round of NSS does not. Our analysis focuses on the extent of old age poverty in the rural sectors of sixteen major states of India.

Columns 2-4 of Table 1 summarise the key demographic characteristics in the major Indian states in our sample. On average, about 27% of sample members coreside with elderly members though some inter-state disparity is observed. For example, while 43% individuals in Kerala live with an elderly person, the proportion is only 21% in AP and Tamil Nadu, 24% in Rajasthan and West Bengal and 25% in Assam, Bihar and MP, all below the national average. Clearly these states are at different stages of demographic development and an important correlate of this inter-state variation of key demographic characteristics would be variation in state-level prosperity.

### **2.1. Unadjusted poverty estimates**

Following Deaton and Paxson (1995), our analysis of old age poverty classifies sample households by living arrangements; in particular, we distinguish between two groups of sample households – households with and without elderly people aged sixty and above. We further distinguish any elderly from *older elderly* often defined as those aged 75 and above. This distinction is particularly important because of deteriorating health and reduced productivity among the group of older elderly. Another factor that may justify this inquiry is the fact that widows tend to be overrepresented in the oldest cohorts. Finally, following the categorical targeting schemes in many states, we use a third classification, i.e., to distinguish between households with and without elderly 65+.

We use average per capita monthly consumer expenditure (APCE) as an indicator of standard of living that is widely used in the literature.<sup>2</sup> Official poverty measures in India are generally based on the household-level data collected by the Indian National Sample Survey Organisation (NSSO) going back to the early 1950's. A person is said to be poor if the average per capita (monthly) consumption expenditure (APCE) is below an officially constructed poverty line (corresponding to a per capita expenditure required to obtain the minimum caloric levels). Since APCE is household-specific, we shall first construct an indicator of household-level poverty head count ratio for households living with/without elderly members. Using the state-level poverty lines  $z_s$ ,<sup>3</sup> we construct the poverty index for the  $s$ -th state  $P_{s0}$ ,  $s = 1, 2, \dots, 16$  as follows:

$$P_{s0} = \frac{1}{n} \left( \frac{\sum_{i=1}^q (z_s - x_{si})}{z_s} \right) \quad (1)^4$$

where  $x_{si}$  is the per capita expenditure of the  $i$ -th household,  $n$  is the total number of individual members in a selected group of households (e.g., with/without elderly members) and  $q$  is the corresponding number of this group of household members who live below the poverty line. These poverty indices for households with and without elderly members are shown in Table 2B. In general, the HCR is lower in households with elderly members.

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<sup>2</sup> Note that Appendix Table A1 summarises the state-level mean APCE (along with independent sample  $t$ -test for comparison of APCE) for households with and without elderly. Clearly the result varies with the definition of the elderly and also across the states.

<sup>3</sup> We take the official 1993-94 state-level poverty line estimates and adjust it by the 1995-96 state-level prices for agricultural labourers to obtain estimates of 1995-96 state-level poverty lines for the rural sectors of these states. Please note that 1993-94 poverty line estimates were not available for Jammu and Kashmir (J&K) and hence we were unable to calculate the poverty HCR for this state. Sarmistha Pal is particularly grateful to P.V. Srinivasan for his help with the calculation of poverty head count ratio.

<sup>4</sup> We could modify this equation to derive the poverty gap and the squared poverty gap indices.



Deaton and Paxson (1995) adopted a slightly different procedure. They divided all household members into elderly (those who are above 60 years of age) and non-elderly (aged sixty or below). Then considering household-specific APCE as the individual consumption expenditure, they counted an individual specific poverty rate to be the proportion of people below an all-India poverty line for six large Indian states in 1987-88. Following Deaton and Paxson (1995), we also compute these individual-specific poverty head count ratios for elderly and non-elderly people in all the selected states (see column 2 of Table 2). In general, individual and household specific poverty head count ratios are comparable for 1995-96. It is however evident that compared to 1987-88, poverty rates are generally lower in 1995-96 for these six states studied by Deaton and Paxson (1995). In addition to economic growth over this period, the reduction of poverty over the period from 1987-88 to 1995-96, could possibly be attributed to the fact that our estimates use state-specific poverty lines while Deaton and Paxson use all-India poverty lines for rural and urban areas. Both methods suffer from the limitation of not having data in the survey on intra-household allocation.<sup>5</sup> The rest of our analysis is based on the household-level poverty rates, commonly used in most poverty studies.

We compare the poverty rates for households with and without elderly members and in this respect, highlight the similarities/differences in poverty rates among households living with various age/gender groups of elderly as defined above. First, we note that poverty rates for households with/without elderly 60+ and 65+ are rather

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<sup>5</sup> There is some evidence that intra-household allocation may not favor the elderly. See, for example, Kochar (1999).

comparable in most states. In general, unadjusted poverty rates tend to be lower for households with elderly in many states. The only clear exception is Kerala.<sup>6</sup>

We also consider poverty rates among households with female elderly: here the difference appears to be marginal when we compare households with any elderly 60+ with those with female elderly 60+; however compared to poverty rates for older elderly 75+ group, poverty rates among households with older female elderly aged 75+ tend to be higher in many states. There are also pronounced inter-state variation in the poverty rates. For example, old age poverty rates tend to be lower in better performing states like Punjab, Haryana than in the worse performing ones (e.g., Bihar, Rajasthan).

Since the poverty rates shown in Table 2 are aggregate measures for each state, we cannot directly test whether the differences in poverty rates between households with and without elderly of any type (60+, 65+ 75+) are statistically significant. Instead we consider the household level data and define a household to be poor if its average monthly per capital expenditure (APCE) is less than the state-level rural poverty line. This allows us to examine the average proportion (i.e. probability) of households living with/without elderly of a given category (60+, 65+ and 75+) to be poor. Results of this mean comparison as summarized in Table 3 shows similarity with our simple poverty HCR comparison discussed above. There is suggestion that households with elderly 60+ and 65+ are significantly more likely to be poor only in Kerala while the reverse is true in Bihar, MP, Orissa, Punjab, UP and West Bengal.<sup>7</sup> Even when we consider households with elderly 75+, these households are significantly less likely to be poor in Bihar, Maharashtra, Orissa, Punjab and West Bengal while the difference is insignificant in

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<sup>6</sup> Similar observation can also be made using alternative poverty indicators, e.g., see Appendix Table A2.

<sup>7</sup> Similar results are obtained using 60<sup>th</sup> round NSS data; see Appendix Table A7.

other states. Similar results are obtained when we consider households with and without elderly female 60+ and 65+ (see panel 2 of Table 3) while the result changes somewhat as we compare poverty likelihood among households with and without older female elderly 75+ who tend to be worse off (relative all older elderly in our sample).

## 2.2. Sensitivity of poverty estimates

Our results presented in section 2.1 could however be somewhat misleading as these estimates, very much like the official poverty estimates in India, do not take account of the differences in household size or age/sex composition of household members. Taking these factors into account has been shown to affect the poverty rates among the elderly in other countries.<sup>8</sup> This section will therefore examine the sensitivity of the poverty head count ratio to differences in age/sex composition of the household members as well as size economies in consumption.

A conventional way of addressing this difficulty is to make use of the equivalence scales that allow us to attach different weights to household members in different age/sex composition. Here we examine the sensitivity of the scale adjusted poverty rates to different choice of weights given to adult male and female (aged above 15 years) and children (aged less than 15 years) respectively: (1,1,0.6), (1,0.8,0.6), (1,0.7,0.5).<sup>9</sup> Our choice has been guided by the weights used by Dréze and Srinivasan (1997). Even when we consider the equivalence scale adjusted poverty estimates (as shown in Appendix Table A3), households with elderly tend to be worse off in most of the sample states,

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<sup>8</sup> For a discussion of international evidence, see Palacios and Sluchynskyy (2006).

<sup>9</sup> Just to clarify, while the weight attached to adult male is taken to be 1 in each of these measures, that for adult female are 1, 0.8 and 0.7 respectively in these measures; similarly the weight attached to a child are considered to be 0.6, 0.6 and 0.5.

irrespective of choice of weights.

We next adjust the poverty rates for the variation in family size. The economies of

scale adjusted per capita expenditure  $y$  for a household of size  $n$  is defined as:  $y = \frac{Y}{n^\theta}$

where  $Y$  is the total household expenditure and  $\theta$  is a parameter lying between 0 and 1. If  $\theta = 1$ , there are no economies of scale ( $y$  is the per capita expenditure) and if  $\theta = 0$ ,  $y$  is the total household expenditure. The latter corresponds to the case of public goods where one person's consumption does not lower the consumption of others in the household. As before, following Drèze and Srinivasan (1997), we have considered 4 possible intermediate values of  $\theta$ , namely, 0.8, 0.6, 0.4 and 0.2 where a weight of 0.2 would indicate higher size economies of consumption compared to 0.8 for example. A household of size  $n$  with total consumption  $Y$  is considered to be poor if  $y$  falls below a pre-specified threshold  $z^S(\theta)$  for a given state  $S=1,2,\dots,K$ . For  $\theta = 1$ , this is the conventional head-count ratio. However, we need some normalization rule to adjust  $z^S(\theta)$  for the size economies of consumption. Following Drèze and Srinivasan (1997), we consider the following rule:

$$z^S(\theta) \equiv z^S(1)m_s^{1-\theta} \quad (2)$$

where  $m_s$  is the average household size in a given state (see Table 1). This in turn implies that a household of average size in a given state is counted as 'poor' if and only if it has a per capita expenditure below  $z^S(1)$  irrespective of the value of  $\theta$ ,  $S=1,2,\dots,K$ . For consistency with the earlier calculations of HCR, we take  $z^S(1)$  to be the state-specific poverty line expenses.

Size adjusted HCR measures are shown in Appendix Table A4 for the two groups of elderly 60+ and 75+. While these estimates show sensitivity of poverty rates to choice of size economies in consumption (namely, 0.8, 0.6, 0.4 and 0.2), poverty rates still tend to be generally lower among households with elderly members. Similarly, these adjusted poverty rate estimates as shown in panel 2 of Appendix Table A4 reiterate the initial observation (based on unadjusted poverty rates for this group) that households with older female elderly tend to be worse off in most states (relative to all older elderly).

Thus the preliminary conclusions drawn in section 2.1 hold: even after adjustment for equivalence scale and size economies in consumption, households with any elderly tend to be better off while households although the sub-category of older female elderly tend to be worse off in some states.

### **3. What Explains Low Relative Poverty Rates among the Elderly?**

The central finding of the last section was that in almost every Indian state, households with elderly members are either just as likely or even less likely to live in poor households relative to households without elderly members. These results reinforce those found by Deaton and Paxson using data for the late 1980s. While similar results have been found in other countries, the global pattern is mixed.<sup>10</sup> In middle and higher income countries, part of the explanation may be found in the extent of pension schemes mandated by the government. This is clearly not the case in rural India. What then would explain this pattern?

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<sup>10</sup> See Whitehouse (200x).

### 3.1. Demographic composition of households with elderly

Our results in section 2 do not appear to support categorical targeting of anti-poverty programmes on the elderly. In order to better understand this finding, let us start by comparing the demographic composition of these two groups of households, households with and without elderly members (all elderly 60+ and older elderly 75+). Table 4 suggests that the sample households differ significantly in terms of family size, dependency ratio and also the labor market participation rates of the elderly. Dependency ratio is defined here as the ratio of dependent to independent members of a household. While dependent members of a household are those children aged 0-14 years and also the elderly adults aged 75-99 years (who are less likely to contribute to family earnings), independent members of the households are those adults aged 15-74 years primarily contributing to family earnings.<sup>11</sup> Average demographic characteristics of a household, namely, family size, dependency ratio and current elderly participation rates for households with and without elderly members (60+ and 75+) are summarised in Table 4. We also compute the independent sample t-statistics for comparison of means of household size and dependency ratio between these two groups of households (with and without elderly 60+ as well as 75+). Generally, average family size is higher among households with elderly (both 60+ and 75+) compared to those without elderly. However, current economic participation rates are lower among households with older elderly (75+), which in turn reflects a higher dependency ratio among households with older elderly group. Even after we control for household demographic composition, households with elderly are likely to be less poor (e.g., see Appendix Table A5). It is then

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<sup>11</sup> Alternatively, we construct a second measure of dependency ratio: dependents are those aged 0-14 years and 60-99 years while independents are those aged 15-59 years.

surprising that the poverty rates among households with elderly, especially those with older elderly, are lower and not higher.

### **3.2. Missing elderly and the Kerala exception**

The one exception to our main result is the state of Kerala. This is clear from Tables 3 and also Appendix Table A5, which show that the poverty rate and the probability of being poor are both higher among elderly households. What clues does the Kerala exception provide?

Kerala is special in many ways ranking at or near the top among Indian states on many education and health indices. Social security coverage (including old age pensions) is higher than in other states due to the prevalence of dozens of state-subsidized ‘welfare funds’.<sup>12</sup> It is one of only two states where the Communist party has dominated for decades and has a heterogeneous religious composition unique in India. Huge remittances from migrants working in the Gulf countries have contributed to growth and helped reduce poverty rates to one of the lowest among the large states. Most importantly for our purposes however, Kerala is much further ahead in its demographic transition and aging process than any other state in our sample.<sup>13</sup>

As in other countries, the rapid aging of Kerala’s population is due to a large decline in fertility as well as longer adult life expectancy (see Table 1). Both developments could affect relative poverty among population sub-groups in several ways. For example, lower fertility would tend to reduce the dependency ratios of households

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<sup>12</sup> See NCEUS (2006).

<sup>13</sup> See Zachariah and Rajan (1997)

without elderly and raise their per capita expenditure levels. Other things constant, this could reduce poverty rates in favor of non-elderly households.

Another possibility is that by reducing mortality for lower income households in general, the number of poor individuals that live to old age increases. According to this hypothesis, one of the explanations for the observed patterns of relative poverty across states is that the poor die earlier and are therefore ‘missing’ from the poor households. If egalitarian social policies in Kerala have reduced the mortality of the poor, the survivorship bias may be less important there than in other states. In other words, the fact that elderly are more likely to be poor in Kerala than in other states could be because the lifetime poor are more likely to survive to old age. Surprisingly then, higher relative poverty among the elderly would imply success rather than failure. Unfortunately, data are not available for samples large enough to compare state-level mortality rates for the elderly by consumption class in order to test the specific hypothesis for Kerala.

### **3.3. Evidence of Survivorship Bias**

However, the broader point – that relative old age poverty can partly be attributed to income-mortality differentials – can be tested in several ways. Most of the studies linking mortality and income levels have used data from higher income countries.<sup>14</sup> These studies have generally found that a link does exist with implications for issues such as savings behavior and the design of pension schemes. The relevance of studies focusing on middle and high income countries to the situation in rural India is limited for a variety of reasons.

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<sup>14</sup> For a review, see Cutler et. al. (2006).



In contrast, a study by Bannerjee and Duflo (2007) focus on the poor elderly in a number of developing countries. The authors start by pointing out that the demographic pyramid for low income households tended to include a higher proportion of elderly for higher income groups. This result held in nine out of 15 countries with only two countries exhibiting the opposite pattern.<sup>15</sup>

Using our NSS data (60<sup>th</sup> round), we show a similar pattern in Table A6. So, for example, the share of total elderly to all adults rises from 18.5 per cent for the lowest quintile to 25.4 per cent in the highest quintile. Similarly, the ratio of persons aged 55+ in the highest decile is 46.9 compared to 27.3 per cent in the lowest decile.<sup>16</sup>

Bannerjee and Duflo next took advantage of a question that is included in household surveys in 11 developing countries that asks whether the respondent's parents are alive. The results were mixed but generally supported an income-mortality differential.

In a similar exercise, we tested data from a special survey commissioned by the Asian Development Bank and conducted in 2004. The national representative sample size included more than 40,000 Indian workers. The survey included a question on whether the respondent's father was still alive. After controlling for the age of the respondent, a probit regression was run to determine whether the probability that the father was still alive was correlated to income. As shown in column (2), Table 5, the log of income was positively and significantly correlated to the probability that the father was alive, further supporting the income-mortality relationship.

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<sup>15</sup> In one of the two countries, South Africa, the results are almost certainly distorted by the presence of a very large social pension scheme.

<sup>16</sup> Similar trend is observed in 52<sup>nd</sup> round NSS data.

The strongest evidence from Bannerjee and Duflo comes from panel data for Indonesia and Vietnam. The authors confirmed a strong link between mortality and income level with the strongest relationship for individuals above age 50. In rural Indonesia, a poor person over age 50 living in a rural area was five times more likely to have died in the next five years than a similar non-poor individual. A similar comparison showed triple the mortality rates in Vietnam among the poorest.

Panel data sets of this type are rarely available and we were not able to apply this methodology in the case of rural India. However, we were able to take advantage of the fact that the 60<sup>th</sup> round NSS reports the age and sex of those who died in the past year.<sup>17</sup> We use this information to select households with members aged 55+ and trace if any member aged 55+ died in these households in the past year.<sup>18</sup> Amongst these households, we then adjusted their total per capita monthly expenditure (apce) to obtain the adjusted apce if these individuals had not died (i.e., household size + no of dead 55 during the previous year). We also adjust the total number of elderly 55+ in these households assuming if these elderly were alive.

Next, we use a probit model to determine the probability that a member aged 55+ dies in the past year considering the log of adjusted apce, sex of the deceased and other variables. Results as shown in column (1) of Table 5 yield a negative and statistically significant coefficient for the consumption variable apce. In other words, higher expenditure per capita is associated with lower mortality for members 55+ (also see figure 2).

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<sup>17</sup> Note that this information was not available in the 52<sup>nd</sup> round NSS.

<sup>18</sup> Given that age at death is available only for the members who died in the past year, we attempted to include as much information as possible. This induced us to focus on the probability of dying at or above 55 years among the households with a member aged 55+. This was further justified by the fact that the probability of death falls sharply (by about 15%) if we instead considered households with elderly 60+.

The implication is that as incomes and expenditure levels rise, elderly mortality would decline and this effect would be greater among poorer households. This suggests that poorer areas of the country would tend to have lower elderly poverty relative to non-elderly poverty. In a final test, we use district-level 52<sup>nd</sup> round NSS data to examine the effect of apce on relative poverty of the elderly defined as the ratio of hcr for households with elderly 60+ to that of households without elderly 60+. As expected, elderly poverty was lower (relative to non-elderly poverty) in districts with lower average per capita expenditure. The results, reported in column (3) of Table 5, further support the explanation for the observed differences in poverty rates between households with and without elderly.

Taken together then, there is evidence that at least part of the explanation for the observed relative poverty differences between households with and without elderly members is due to the fact that the poor elderly are ‘missing’ due to their higher mortality rates. As discussed below, this explanation has policy implications including how we look at categorical targeting of cash transfers to the elderly.

Figure 3 plots the predicted male and female 55+ mortality rates as well as those in the bottom decile of the distribution of apce (using estimates shown in column (2) of Table 5). This clearly highlights that the survivorship bias in our sample is driven by the mortality difference of poor and non-poor male elderly 55+ while the mortality difference among poor and non-poor female elderly is rather marginal. The latter could perhaps explain as to why households with older female elderly 75+ tend to be worse off in a number of states (e.g., see Table 2).

#### 4. Policy implications

Our analysis has shown that poverty rates among the elderly in India are similar or lower than poverty rates among those living in non-elderly households. The single clear exception to this pattern is the demographically advanced state of Kerala. The interpretation of this finding is important; if a high relative poverty rate of the old is due to consumption-mortality differentials and a survivorship bias, then observed relative poverty rates may not be a good yardstick for assessing whether the elderly are a good candidate for categorical targeting.

The admittedly scarce international evidence as well as the evidence presented in this paper for India, supports the survivorship bias hypothesis. What are the implications of these findings? First, it suggests that changes in policy or circumstances that lead to higher survival rates among the poor elderly may, paradoxically, increase poverty among the old relative to other groups. This happens because the old are alive to be counted in the denominator and this generally reduces per capita income.<sup>19</sup> Economic growth, higher remittances, better health care or an increase in social pension benefits could all improve the chances that the poor survive to old age and therefore, could increase the proportion and number of poor elderly. Given this counterintuitive result, it may be better to focus on other indicators such as mortality and morbidity rates of the elderly when assessing the impact of different policies and programs.

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<sup>19</sup> A similar point has been made with regard to increased survival rates of children by Acemoglu and Johnson (2005).

The increased dependency rate of poor households could have important effects on the consumption of the rest of the members of the household. This could be offset to the extent that the elderly are contributing to the overall income of the household. However, the data suggest that this contribution is relatively small in poor households with elderly. Moreover, the impact of mortality reducing income gains or health services is most likely to occur among individuals that are weak or sick and therefore less productive.

The results also have implications for pension policy. If the pattern observed in Kerala is replayed in other states as they pass through their own demographic transitions, the proportion of the poor that are elderly will increase, as will the costs of the social pension program. It would also increase the dependency ratio of poor households. Of course, this could be offset by a decline in absolute poverty rates that often accompanies the aging process as well as an expansion (albeit very gradual) in the role of contributory pension systems.

The evidence of an income-mortality link should also influence thinking about social pension design. Advocates of universal pensions<sup>20</sup> that are paid to all citizens above a certain age, as in neighboring Nepal, must justify a much more regressive transfer than would have been the case if this link did not exist. Simply put, the rich would receive such a transfer for much longer than the poor.<sup>21</sup> In contrast, well targeted schemes with lower initial eligibility ages could pay higher benefits to more poor elderly.

In this context, the recent initiatives by the Government of India to dramatically expand its social pension program provide a unique opportunity to assess the efficacy of

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<sup>20</sup> See for example, Willmore (200x) and HelpAge International (2006).

<sup>21</sup> The Nepali case is especially relevant since the eligibility age for the universal benefit is set at 75, partly due to the limited budget and the need to pay all citizens that meet the age requirement.

social pensions as well as behavioral reactions within households.<sup>22</sup> Much depends, of course, on implementation of the schemes and their ability to deliver benefits to the poor.<sup>23</sup> Surprisingly, the success of this initiative may actually increase elderly poverty rates by reducing the mortality of the target population.

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<sup>22</sup> Another program, the Rashtriya Swasthya Bima Yojana health insurance scheme targeted to households below poverty level regardless of age or pre-existing conditions, may also result in an increase in elderly poverty rates by reducing mortality rates.

<sup>23</sup> For detailed analysis of social pensions in the states of Rajasthan and Karnataka see Vasudeva (2008) and Murgai (2008).

## References

- Alam, M. 2004. 'Ageing, Old Age Income Security and Reforms: An exploration of Indian Situation', in *Economic and Political Weekly*, August 14, 2004, pp. 3731-3740.
- Bannerjee, A. and E. Duflo 2007 'Aging and Death under a Dollar a Day', mimeo, MIT.
- Barrientos, A, M. Gorman and A. Heslop. 2003. 'Old Age Poverty in Developing Countries: Contributions and Dependence in Later Life', *World Development* 31(3), pp. 555-70.
- Cutler, D., A. Deaton and A. Lleras-Muney 2006. 'The Determinants of Mortality', NBER working paper no. 11963, Cambridge, Massachusetts.
- Deaton, A. and C. Paxson. 1995. 'Measuring Poverty among the Elderly', NBER working paper no. 5296, Cambridge, Massachusetts.
- Deaton, A. and C. Paxson. 1998. 'Economies of Scale, Household Size and the Demand for Food', *Journal of Political Economy*, 106, pp. 898-930.
- Drèze, J. and P.V. Srinivasan. 1997. 'Widowhood and Poverty in Rural India: Some Inferences from Household Survey Data', *Journal of Development Economics* 54, pp. 217-34.
- Ghosh, S and S. Pal. 2004. 'The Effect of Inequality on Growth: Theory and Evidence from the Indian States', *Review of Development Economics*, 2004, February 8(1).
- HelpAge India 2003. 'Non-contributory pension in India: A case study of Uttar Pradesh', Research and Development Division, HelpAge India, New Delhi, June 2003.
- HelpAge International 2006. 'The need for social pensions',
- Kakwani, N, K. Subbarao and A. Schwarz.2004. 'Living Conditions of Elderly in Africa and the Role of Social Protection, mimeo, World Bank.
- Knodel, J. N. Chayovan and S. Siriboon. 1992. 'The Impact of Fertility Decline on Familial Support for the Elderly: An Illustration from Thailand', *Population and Development Review* 18(1): 79-103.
- Kochar 1999. "Evaluating Familial Support for the Elderly: The Intrahousehold Allocation of Medical Expenditures", *Economic Development and Cultural Change*, The University of Chicago.
- Murgai, R. 2008. "Social Pensions in Karnataka", forthcoming as World Bank Pension Reform Primer working paper.
- Pal, S. 2007. 'Intergenerational Transfers and Elderly Coresidence with Adult Children in Rural India', discussion paper IZA, University of Bonn, Germany.
- Palacios, R. 2006, "Expanding Pension Coverage to the Informal Sector", mimeo World Bank.
- Palacios R. and O. Sluchynsky 2006. "The role of social pensions", Pension Reform Primer working paper series, World Bank.
- Prakash, I. 1999. 'Ageing in India', paper prepared for World Health Organization.
- Rajan, S.I., U.S. Mishra and P.S. Sharma. 1999. *Indian's Elderly: Burden or Challenge?* Sage Publications, New Delhi.

- Subbarao, K. 2005. 'Aging and Poverty in Africa and the Role of Social Pensions', mimeo, World Bank.
- Vasudeva-Dutta, P. (2008) 'Social Pensions in Rajasthan', forthcoming as World Bank Pension Reform Primer working paper.
- Visaria, P. 1998. 'Demographics of Ageing in India: An Abstract', [www.iief.com/paper/pravinvisaria.pdf](http://www.iief.com/paper/pravinvisaria.pdf).
- Willmore L. 2007. 'Universal Pensions for Developing Countries', World Development vol. 35, number 1, pp. 24-51.
- World Bank. 2001. 'India: The Challenge of Old Age Income Security', Report No. 22034-IN, Finance and Private Sector Development Division, South Asia Region, Washington D.C.
- Zachariah C. and S.I. Rajan 1997 'Kerala's Demographic Transition: Causes and Consequences', Sage Publications, New Delhi.
- Zimmer, Z. and J. Kwong. 2003. 'Family Size and Support of Older Adults in Urban and Rural China: Current Effects and Future Implications', *Demography* 40(1): 23-44.
- Zimmer, Z., J. Knodel, K.S. Kim and S. Puch. 2006. 'The Impact of Past Conflicts on the Elderly in Cambodia', *Population and Development Review* 32(2): 333-36.



Table 1. Selected state characteristics

States	(1)		(2)		(3)				(4)
	Current pension[1] (Rs/ month)	Min. age of eligibility (years) [1]	Living with old >=60	Total hholds	Total popn [2]	living with old 60+	Living with old 75+	living with female elderly 60+	Life expectancy (1991)
AP	75	65	0.19	4957	22705	0.21	0.031	0.12	63.1
Assam	60	65 (male), 60(female)	0.20	3287	17452	0.26	0.034	0.127	57.2
Bihar	100	60	0.21	6668	38819	0.26	0.053	0.162	60.2
Gujarat	100, 275	60-65 65+	0.23	2494	13710	0.25	0.055	0.171	62.5
Haryana	100	60	0.27	1065	6272	0.31	0.085	0.214	64.5
Karnataka	100	65	0.24	2558	14366	0.30	0.056	0.183	64.0
Kerala	110	65	0.37	2850	13990	0.43	0.11	0.282	73.5
MP	150	60 (male) 50 (female)	0.21	5161	28822	0.26	0.053	0.171	56.4
Maharashtra	100	65(male) 60 (female)	0.30	4286	22458	0.34	0.068	0.216	65.8
Orissa	100	65	0.26	3219	16301	0.32	0.07	0.187	57.7
Punjab	200	65 (male) 60 (female)	0.25	2227	12592	0.30	0.091	0.204	68.1
Rajasthan	200, 300	58 (male) 55(female)	0.20	3112	17594	0.24	0.057	0.167	60.5
Tamilnadu	150	60	0.19	4238	17856	0.21	0.042	0.107	64.6
UP	125	60	0.28	8651	52292	0.33	0.078	0.013	58.4
WB	300	60	0.20	4612	24095	0.24	0.045	0.48	63.4
All India [3]	-	-	0.23	71284	380885	0.27	0.062		62.5

Note:[1] Source: Help Age India: <http://www.helpageindia.org/scg2.php>. [2] This is simply the sum of all household members in a state.

[3] 52<sup>nd</sup> round NSS also includes households from other Indian states as well.

**TABLE 2. Unadjusted household and individual level rural poverty head-count ratio**

STATES	(1) Poverty HCR for households with						(2) Individual level hcr		(3) Poverty HCR for households with female	
	elderly 60+	No elderly 60+	elderly 65+	No elderly 65+	elderly 75+	No elderly 75+	Elderly	Non-elderly	Elderly 60+	elderly 75+
AP	0.18	0.20	0.20	0.20	.15	.16	0.17	0.20	0.18	0.14
Assam	0.45	0.49	0.46	0.48	.36	.43	0.40	0.48	0.46	0.50
Bihar	0.52	0.58	0.5	0.58	.42	.52	0.45	0.57	0.51	0.46
Gujarat	0.20	0.21	0.19	0.21	.13	.18	0.16 (0.31)	0.21 (0.43)	0.19	0.1
Haryana	0.15	0.19	0.16	0.19	.16	.15	0.13	0.18	0.18	0.23
Karnataka	0.32	0.31	0.32	0.32	0.24	0.25	0.23 (0.49)	0.32 (0.54)	0.34	0.27
Kerala	0.18	0.14	0.17	0.15	0.14	0.12	0.15 (0.26)	0.15 (0.31)	0.17	0.17
MP	0.33	0.37	0.32	0.37	0.30	0.31	0.28 (0.55)	0.36 (0.62)	0.32	0.30
Maharashtra	0.28	0.28	0.27	0.29	0.18	0.23	0.21 (0.49)	0.29 (0.54)	0.27	0.25
Orissa	0.41	0.51	0.41	0.5	0.34	0.44	0.39	0.49	0.45	0.38
Punjab	0.06	0.11	0.06	0.11	0.05	0.09	0.05	0.10	0.06	0.02
Rajasthan	0.20	0.20	0.20	0.2	0.17	0.16	0.17	0.20	0.22	0.25
Tamilnadu	0.29	0.29	0.30	0.29	0.24	0.24	0.23 (0.50)	0.30 (0.55)	0.28	0.32
UP	0.42	0.45	0.42	0.44	0.37	0.38	0.37	0.44	0.44	0.45
WB	0.41	0.52	0.39	0.51	0.34	0.45	0.37	0.50	0.43	0.47

Notes: These figures show the proportion of total people in each category who live below the state-specific poverty lines. [1] These estimates are the same whether we consider household-level or individual level approach. Numbers in parentheses (column 2) indicate the corresponding Deaton & Paxson (1995) estimates for 1987-88 for these states.

**TABLE 3. Comparison of poverty likelihood**

STATES	Households with			Households with			Households with		
	elderly 60+	no elderly 60+	Difference significant T-stat	elderly 65+	no elderly 65+	Difference significant T-stat	elderly 75+	no elderly 75+	Difference significant T-stat
AP	0.158	0.16	-0.433	0.18	0.16	1.147	0.147	0.163	-0.488
Assam	0.41	0.44	-1.552	0.43	0.43	-0.063	0.36	0.43	-1.441
Bihar	0.47	0.53	-4.377**	0.45	0.53	-4.659**	0.42	0.52	-3.161**
Gujarat	0.16	0.18	-1.171	0.15	0.18	-1.288	0.13	0.18	-1.610
Haryana	0.14	0.16	-0.942	0.148	0.155	-0.264	0.158	0.154	0.096
Karnataka	0.25	0.25	-0.089	0.249	0.252	-0.155	0.24	0.25	-0.213
Kerala	0.15	0.11	3.460**	0.15	0.11	2.467**	0.14	0.12	0.953
MP	0.28.	0.32	-3.076**	0.27	0.32	-2.938**	0.297	0.31	-0.549
Maharashtra	0.22	0.23	-0.708	0.215	0.31	-1.045	0.18	0.23	-1.826*
Orissa	0.38	0.45	-3.401**	0.38	0.45	-3.002**	0.34	0.44	-2.716**
Punjab	0.06	0.09	-3.018**	0.06	0.09	-2.577**	0.05	0.087	-1.832*
Rajasthan	0.16	0.16	0.169	0.159	0.161	-0.071	0.168	0.16	0.241
Tamilnadu	0.24	0.24	-0.063	0.239	0.237	0.123	0.238	0.237	0.20
UP	0.36	0.39	2.222*	0.37	0.38	-1.028	0.37	0.38	-0.387
WB	0.38	0.47	-4.901**	0.36	0.46	-4.743**	0.335	0.454	-3.204**

**TABLE 3. Comparison of poverty likelihood (continued)**

STATES	Households with			Households with			Households with		
	Female elderly 60+	no female elderly 60+	Difference significant T-stat	Female elderly 65+	no female elderly 65+	Difference significant T-stat	Female elderly 75+	no female elderly 75+	Difference significant T-stat
AP	0.159	0.163	-0.199	0.18	0.16	0.839	0.12	0.16	-1.202
Assam	0.426	0.432	-0.232	0.50	0.43	1.862*	0.47	0.43	0.479
Bihar	0.46	0.53	-3.603**	0.46	0.53	-2.865*	0.498	0.499	-1.821*
Gujarat	0.16	0.18	-1.030	0.14	0.18	1.791*	0.09	0.18	-2.495*
Haryana	0.17	0.15	0.500	0.159	0.153	0.202	0.23	0.15	1.125
Karnataka	0.27	0.25	0.915	0.26	0.25	0.462	0.21	0.25	-0.739
Kerala	0.16	0.11	2.885**	0.16	0.12	2.147*	0.17	0.12	1.474
MP	0.27	0.32	-2.724**	0.28	0.32	-1.923*	0.27	0.31	-1.207
Maharashtra	0.216	0.23	-0.866	0.21	0.23	-0.983	0.21	0.23	-0.498
Orissa	0.42	0.44	-0.669	0.41	0.44	-0.994	0.39	0.44	-0.886
Punjab	0.06	0.09	-2.388*	0.07	0.08	-1.140	0.15	0.28	-3.864**
Rajasthan	0.18	0.16	1.097	0.163	0.16	0.178	0.20	0.16	1.040
Tamilnadu	0.23	0.24	-0.440	0.24	0.237	0.160	0.25	0.24	0.238
UP	0.38	0.379	0.116	0.39	0.38	0.484	0.40	0.38	0.748
WB	0.41	0.45	-2.046*	0.40	0.45	-1.903*	0.41	0.45	-0.688

Note. A household is considered to be poor if its average per capita monthly expenditure (APCE) is less than the state poverty line in 1995. Poverty likelihood is then calculated as the simple proportion of total households living with/without elderly of different categories 60+, 65+ and 75+. We also compute the corresponding t-statistics for comparison of the proportions of households with and without elderly.

**Table 4. A Comparison of demographic composition of households with and without elderly members**

States	Household size		Dependency ratio		Household size		Dependency ratio		Current economic participation rate among	
	With old 60+	Without old 60+	With old 60+	Without old 60+	With old 75+	Without old 75+	With old 75+	Without old 75+	elderly 60+	elderly 75+
AP	5.14	4.45	0.25	0.35	5.53	4.56	0.47	0.32	0.39	0.17
t-statistic	6.933**		12.616**		3.568**		8.329**			
Assam	6.75	4.95	0.29	0.38	4.15	2.24	0.45	0.36	0.32	0.09
t-statistic	14.300**		10.664**		4.170**		4.021**			
Bihar	7.16	5.46	0.37	0.41	7.88	5.74	0.55	0.39	0.43	0.26
t-statistic	15.566**		6.329**		7.767**		14.02**			
Gujarat	6.14	5.31	0.29	0.35	6.33	5.46	0.48	0.33	0.34	0.28
t-statistic	5.913**		5.018**		2.689**		7.839**			
Haryana	6.75	5.57	0.35	0.40	7.03	5.80	0.51	0.37	0.24	0.06
t-statistic	6.017**		3.639**		3.482**		5.990**			
Karnataka	6.94	5.19	0.31	0.36	7.48	5.53	0.47	0.34	0.38	0.17
t-statistic	10.309**		4.773**		3.835**		7.205**			
Kerala	5.73	4.43	0.28	0.29	5.68	4.83	0.45	0.27	0.30	0.12
t-statistic	14.143**		1.364		5.315**		14.789**			
MP	6.84	5.25	0.33	0.39	7.35	5.51	0.49	0.37	0.40	0.17
t-statistic	13.360**		8.909**		7.089**		9.473**			
Maharashtra	6.01	4.92	0.31	0.37	6.36	5.17	0.47	0.34	0.44	0.16
t-statistic	11.034**		8.228**		5.645**		8.892**			
Orissa	6.19	4.67	0.30	0.35	6.61	4.98	0.49	0.33	0.38	0.09
t-statistic	11.894**		5.992**		6.050**		11.081**			
Punjab	6.73	5.29	0.33	0.36	6.76	5.56	0.48	0.34	0.24	0.07
t-statistic	10.131**		2.293*		4.888**		8.568**			
Rajasthan	6.72	5.39	0.36	0.41	7.28	5.58	0.55	0.39	0.38	0.15
t-statistic	9.022**		4.868**		5.368**		10.035**			
Tamil Nadu	4.47	4.15	0.23	0.30	4.57	4.20	0.48	0.28	0.47	0.23

t-statistic	3.601**		7.609**		1.863*		11.859**			
UP	7.08	5.64	0.35	0.42	7.78	5.93	0.53	0.39	0.42	0.23
t-statistic	15.694**		11.419**		9.223**		16.541**			
WB	6.39	4.94	0.29	0.39	6.38	5.18	0.46	0.36	0.35	0.15
t-statistic	12.720**		12.074**		4.618**		7.660**			
<b>All India</b>	<b>6.38</b>	<b>5.03</b>	<b>0.31</b>	<b>0.37</b>	<b>6.75</b>	<b>5.27</b>	<b>0.49</b>	<b>0.35</b>	<b>0.39</b>	0.17
t-statistic	46.631**		30.388**		22.667**		40.833**			

Note: T-statistics are computed to compare the means of variables between households with and without elderly members. Here \* denotes significance at least at 5% and \*\* denote that at 1% or lower level.

**Table 5. Relationship between income/expenditure and elderly poverty and mortality rates**

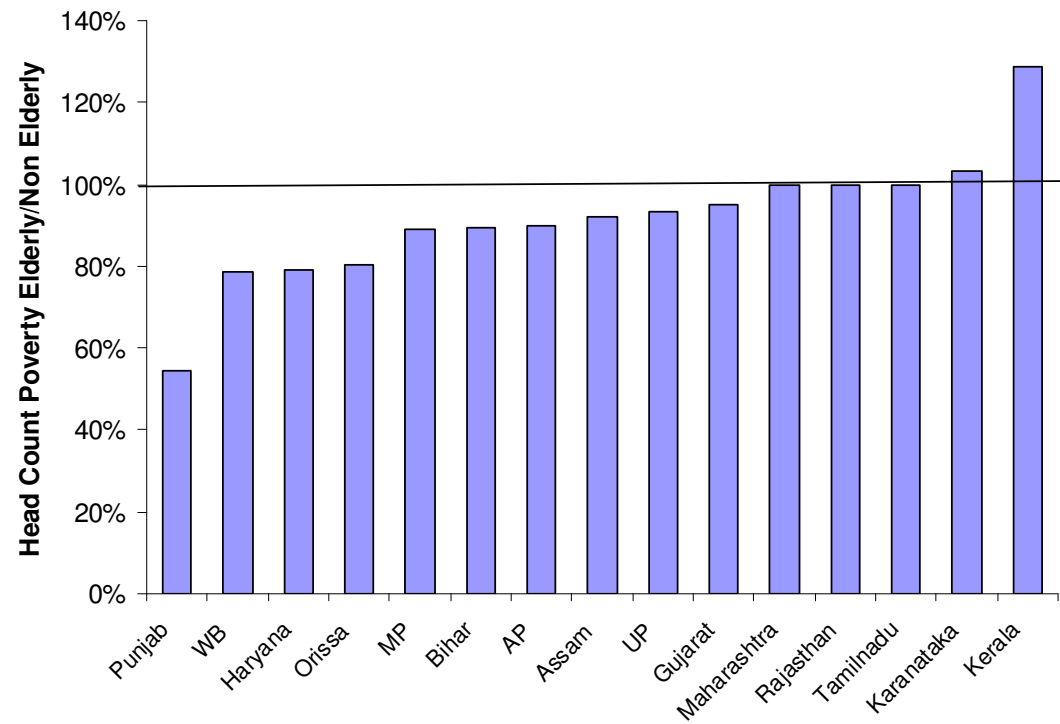
	(1) NSS 60 <sup>th</sup> round Household-level	(2) IIEF database Individual level	(3) NSS 52nd round District-level
<b>Explanatory variables</b>	Dep: Death of 55+ in households with 55+	Dep: Death of father	Dep: HCR of hhs. With elderly 60+ relative to HCR of hhs. without 60+
Log (APCE)	-0.19 (4.960)**		0.13 (2.318)*
Log(income)		0.04 (14.44)**[1]	
Age 55+	0.03 (12.121)**		-
Male 55+	1.01 (3.292)**		-
State-effects	Yes		Yes
Intercept	Yes		Yes
Log-L	-1388.570	-23978.642	
Chi-square	126.9693	6164.31	
F-stat			4.184**
Nobs	18829	40838	462

Note: T-statistics are shown in the parentheses. ‘\*\*’ denotes significance at 10% level and ‘\*\*\*’ at 1% level.

[1] Other control variables include age and square of age of the individual.

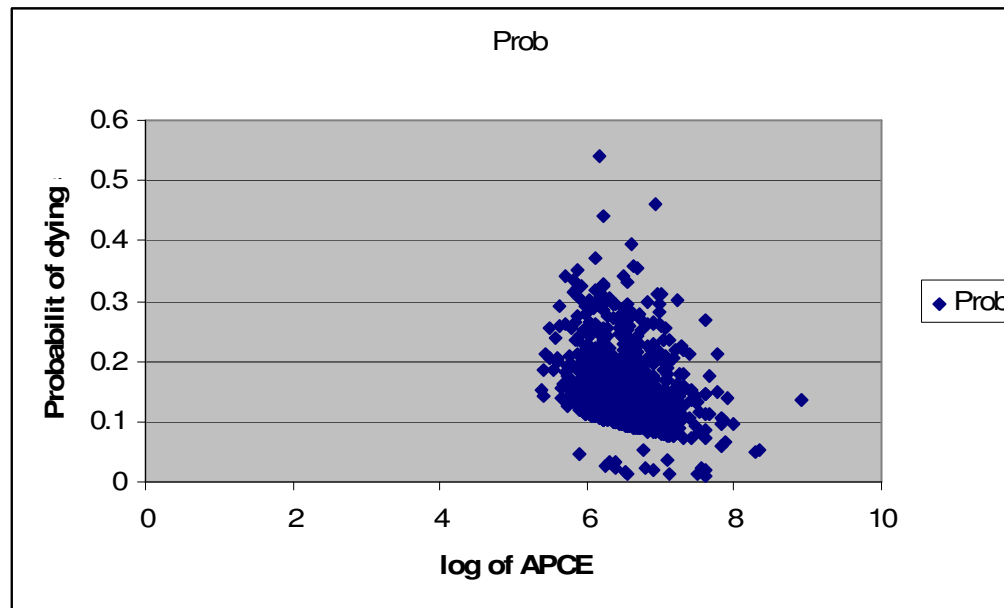
[2] IIEF – Invest India Economic Foundation, www.iief.com

**Figure 1: Relative elderly poverty rates across states, NSS 52**



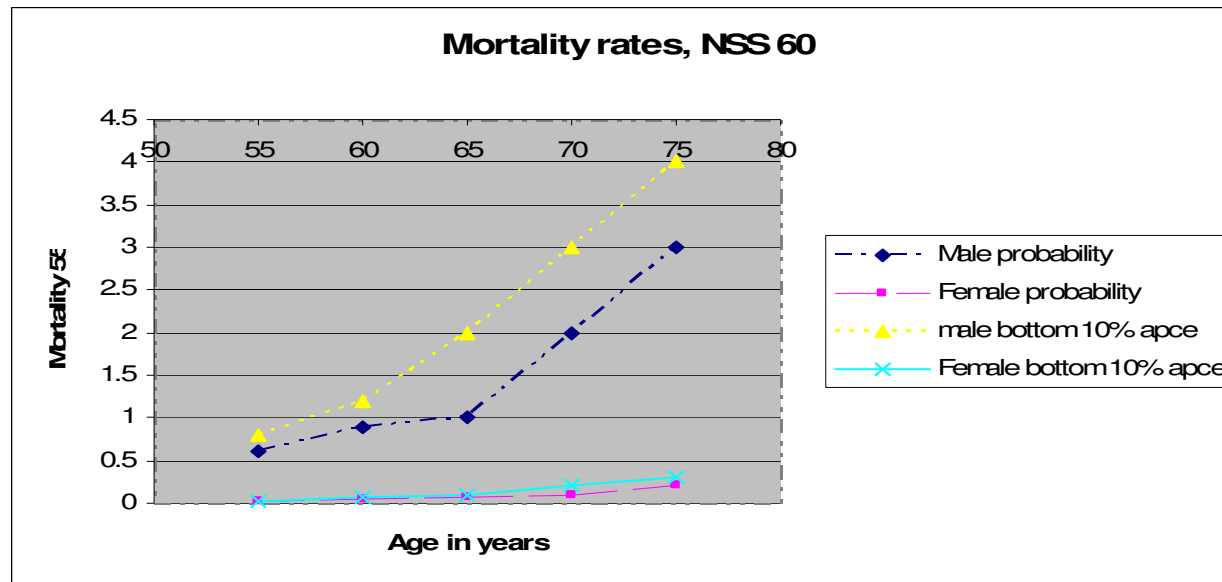
Source: Table 2.

**Figure 2: Expenditure distribution of predicted probability of death at age 55+**





**Figure 3. Age distribution of predicted elderly male/female 55+ mortality rates (%)**



## Appendix

**Table A1. Comparison of Mean APCE between households with and without elderly members**

	<b>With old 60+</b>	<b>Without old 60+</b>	<b>With old 75</b>	<b>Without old 75+</b>
<b>AP</b>	323.8	308.5	323.8	311.0
T-stat [1]	2.352**		0.958	
<b>Assam</b>	313.3	312.4	345.3	311.7
T-stat	0.189		2.177*	
<b>Bihar</b>	282.4	275.7	297.7	276.3
T-stat	1.855*		2.599**	
<b>Gujarat</b>	228.0	193.7	406.6	394.6
T-stat	2.130*		0.772	
<b>Haryana</b>	461.9	479.7	435.1	477.9
T-stat	-0.764		-1.758*	
<b>Karnataka</b>	331.4	330.9	370.8	329.4
T-stat	0.054		2.144*	
<b>Kerala</b>	455.7	503.2	460.5	488.4
T-stat	-3.342**		-1.557	
<b>MP</b>	314.8	305.0	321.2	306.4
T-stat	1.938*		0.932	
<b>Maharashtra</b>	345.1	342.5	363.7	342.1
T-stat	0.439		1.606	
<b>Orissa</b>	279.1	272.2	293.3	272.9
T-stat	1.315		2.278*	
<b>Punjab</b>	549.0	512.3	548.9	519.3
T-stat	2.774**		1.382	
<b>Rajasthan</b>	378.4	389.9	378.3	388.1
T-stat	-1.743*		-0.809	
<b>Tamil Nadu</b>	341.5	336.4	339.2	337.3
T-stat	0.818		0.142	

<b>UP</b>	330.3	325.6	320.8	327.3
T-stat	1.132		-1.017	
<b>West Bengal</b>	334.5	301.9	145.0	136.3
T-stat	5.820**		3.891**	
<b>All India</b>	357.4	350.7	369.8	351.4
T-stat	3.735**		5.310**	

**Note:** The table above reports the independent sample t-statistics used for comparison of mean APCE between households with and without elderly (60+ or 75+). Please note that the reported t-statistics here assume unequal variances for the two sub-samples. Here \* denotes significance at least at 5% and \*\* denote that at 1% or lower level.

**TABLE A2. Other unadjusted household-level rural poverty indices**

STATE	Population living with elderly 60+		Population living without elderly 60+	
	Poverty gap index	Squared poverty gap index	Poverty gap index	Squared poverty gap index
AP	.0051	.0013	.0059	.0015
Assam	.0118	.0036	.0187	.0057
Bihar	.0140	.0043	.0222	.0070
Gujarat	.0043	.0011	.0060	.0017
Haryana	.0032	.0008	.0044	.0010
Karnataka	.0076	.0023	.0105	.0033
Kerala	.0042	.0010	.0038	.0010
MP	.0069	.0019	.0119	.0033
Maharashtra	.0062	.0016	.0097	.0031
Orissa	.0118	.0035	.0219	.0071
Punjab	.0012	.0003	.0024	.0006
Rajasthan	.0033	.0008	.0044	.0011
Tamilnadu	.0098	.0028	.0101	.0028
UP	.0108	.0033	.0142	.0043
WB	.0109	.0030	.0201	.0059

**TABLE A3. Equivalence scale adjusted poverty head count ratio**

STATES	Households with elderly 60+			Households without elderly60+			Households with elderly 75+			Households without elderly75+		
	Weights			Weights			Weights			Weights		
	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5
AP	.03	.03	.22	.18	.15	.21	.18	.14	.02	.15	.12	.09
Assam	.06	.05	.24	.19	.14	.35	.30	.25	.04	.31	.26	.21
Bihar	.06	.06	.25	.22	.20	.40	.37	.31	.04	.32	.29	.24
Gujarat	.03	.02	.20	.18	.15	.21	.19	.16	.02	.16	.14	.12
Haryana	.04	.04	.20	.18	.17	.18	.15	.12	.03	.15	.12	.09
Karnatak	.06	.04	.15	.12	.09	.26	.23	.19	.03	.22	.19	.15
Kerala	.08	.06	.15	.13	.11	.18	.14	.11	.04	.15	.11	.08
MP	.04	.03	.16	.13	.10	.30	.27	.23	.03	.24	.21	.18
Marras	.06	.05	.17	.15	.13	.26	.23	.19	.04	.21	.18	.14
Orissa	.08	.06	.23	.19	.13	.40	.35	.30	.05	.34	.30	.24
Punjab	.02	.02	.10	.09	.08	.15	.13	.10	.01	.12	.10	.08
Rajasthan	.03	.02	.14	.13	.12	.21	.19	.15	.02	.16	.13	.10
Tamilnadu	.04	.03	.29	.26	.20	.27	.23	.19	.03	.20	.17	.13
UP	.08	.07	.26	.22	.19	.34	.30	.26	.06	.27	.24	.19
WB	.05	.04	.21	.18	.15	.36	.32	.27	.03	.31	.27	.22

Note: These estimates are not available for J&K as we were unable to find a poverty line for the state in 1995-96. It is clear that the poverty head count ratio declines as we adjust for the equivalence scale and also that these adjusted poverty rates are less for households with elderly in all the Indian states.

**TABLE A3. Equivalence scale adjusted poverty head count ratio (continued)**

state	Equivalence scale adjusted for female elderly 60+			Equivalence scale adjusted for female elderly 75+		
	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5	1, 1, 0.6	1, 0.8, 0.6	1, 0.7, 0.5
AP	0.11	0.1	0.07	0.10	0.09	0.05
Assam	0.17	0.14	0.10	0.17	0.16	0.07
Bihar	0.18	0.16	0.13	0.15	0.11	0.09
Gujarat	0.08	0.06	0.05	0.10	0.10	0.08
Haryana	0.11	0.1	0.08	0.17	0.14	0.14
Karnataka	0.14	0.11	0.07	0.06	0.05	0.02
Kerala	0.11	0.09	0.07	0.13	0.11	0.08
MP	0.1	0.09	0.08	0.09	0.07	0.05
Marras	0.11	0.1	0.08	0.05	0.04	0.04
Orissa	0.17	0.14	0.10	0.13	0.09	0.03
Punjab	0.05	0.04	0.03	0.05	0.04	0.03
Rajasthan	0.07	0.06	0.05	0.07	0.06	0.05
Tamilnadu	0.16	0.13	0.12	0.18	0.14	0.12
UP	0.15	0.14	0.11	0.16	0.14	0.09
WB	0.17	0.14	0.12	0.13	0.10	0.10

**Table A4: Size economies of scale adjusted poverty head count ratio**

States	With old 60+ Weights				Without old 60+ Weights				With old 75+ Weights				Without old 75+ Weights			
	0.8	0.6	0.4	0.2	0.8	0.6	0.4	0.2	0.8	0.6	0.4	0.2	0.8	0.6	0.4	0.2
AP	0.04	0.04	0.04	0.05	0.23	0.26	0.29	0.21	.15	.13	.14	.16	.2	.21	.24	.27
Assam	0.12	0.1	0.08	0.07	0.48	0.47	0.46	0.49	.34	.26	.19	.16	.5	.44	.42	.41
Bihar	0.16	0.13	0.11	0.1	0.55	0.54	0.53	0.57	.35	.29	.26	.23	.5	.51	.49	.48
Gujarat	0.05	0.04	0.04	0.04	0.18	0.19	0.2	0.19	.11	.09	.09	.09	.2	.18	.17	.18
Haryana	0.06	0.05	0.05	0.05	0.19	0.19	0.2	0.19	.14	.13	.12	.10	.2	.17	.17	.18
Karanata	0.1	0.08	0.07	0.06	0.3	0.29	0.3	0.3	.18	.15	.12	.12	.3	.27	.26	.26
Kerala	0.1	0.07	0.06	0.06	0.11	0.12	0.14	0.12	.11	.08	.09	.09	.1	.11	.10	.12
MP	0.08	0.07	0.06	0.05	0.36	0.36	0.36	0.36	.22	.18	.15	.13	.3	.32	.32	.32
Marras	0.1	0.08	0.07	0.07	0.26	0.26	0.27	0.26	.13	.09	.10	.09	.2	.24	.23	.23
Orissa	0.14	0.12	0.11	0.11	0.5	0.5	0.5	0.51	.21	.17	.16	.15	.5	.44	.44	.43
Punjab	0.02	0.02	0.02	0.02	0.11	0.12	0.14	0.1	.05	.04	.06	.05	.1	.10	.10	.11
Rajasthn	0.04	0.03	0.03	0.03	0.17	0.18	0.2	0.17	.15	.10	.07	.08	.2	.15	.17	.18
T Nadu	0.07	0.05	0.05	0.05	0.23	0.22	0.22	0.26	.22	.17	.18	.18	.3	.23	.22	.22
UP	0.17	0.14	0.12	0.12	0.41	0.41	0.41	0.42	.34	.27	.20	.18	.4	.38	.37	.36
WB	0.11	0.09	0.08	0.07	0.5	0.48	0.47	0.51	.26	.20	.19	.16	.5	.45	.44	.42

**Table A4: Size economies of scale adjusted poverty head count ratio (continued)**

state	Size economies adjusted for female elderly 60+ with weights				Size economies adjusted for female elderly 75+ with weights			
	<b>0.8</b>	<b>0.6</b>	<b>0.4</b>	<b>0.2</b>	<b>0.8</b>	<b>0.6</b>	<b>0.4</b>	<b>0.2</b>
AP	0.16	0.15	0.15	0.16	0.13	0.08	0.08	0.12
Assam	0.38	0.3	0.25	0.23	0.47	0.34	0.25	0.22
Bihar	0.44	0.36	0.31	0.28	0.38	0.33	0.24	0.21
Gujarat	0.16	0.13	0.12	0.11	0.09	0.08	0.1	0.09
Haryana	0.16	0.13	0.13	0.12	0.21	0.22	0.2	0.13
Karnataka	0.26	0.21	0.19	0.17	0.14	0.13	0.12	0.13
Kerala	0.14	0.11	0.1	0.1	0.12	0.12	0.11	0.12
MP	0.24	0.21	0.17	0.16	0.21	0.18	0.17	0.16
Mizoram	0.18	0.15	0.14	0.13	0.15	0.09	0.09	0.07
Orissa	0.33	0.28	0.26	0.24	0.24	0.21	0.19	0.16
Punjab	0.05	0.05	0.05	0.05	0.03	0.03	0.05	0.07
Rajasthan	0.13	0.11	0.11	0.11	0.18	0.12	0.08	0.08
Tamil Nadu	0.25	0.21	0.22	0.21	0.21	0.12	0.13	0.14
UP	0.35	0.29	0.24	0.23	0.39	0.31	0.22	0.2
WB	0.36	0.29	0.25	0.21	0.34	0.25	0.22	0.17

**Table A5. Effects of presence of an elderly 60+ and 75+ on incidence of poverty, NSS 52**

	Logit estimates of incidence of poverty		Logit estimates of incidence of poverty	
	Coefficient of Old60+	LR chi-square statistic	Coeff of OLD75	Chi-square
AP [1]	-0.09	566.6**	-0.22	466.5**
Assam	-0.50**	412.3**	-0.61**	182.1**
Bihar	-0.39**	970.4**	-0.53**	758.4**
Gujarat	-0.25**	368.3**	-0.41	334.6**
Haryana	-0.26	172.2**	-0.09**	132.5**
Karnataka	-0.40*	356.8**	-0.39	295.3**
Kerala	0.11*	167.1**	-0.02	142.7**
MP	-0.41**	924.5**	-0.18	839.5**
Maharashtra	-0.20**	670.3**	-0.54**	576.4**
Orissa	-0.28**	704.3**	-0.44**	631.9**
Punjab	-0.54**	217.2**	-0.72**	155.2**
Rajasthan	-0.12	348.9**	-0.26	325.9**
Tamilnadu	-0.02	526.5**	-0.04	482.1**
UP	-0.26**	993.2	-0.22**	817.4**
WB	-0.45**	768.5**	-0.55**	591.9**
All India [2]	-0.24**	16243.6**	-0.32**	14372.2**

Note: [1] Other control variables include dummy variables for scheduled caste and scheduled tribe. [2] Here, in addition to other control variables as noted in [1], we control for regional dummies as well. Here \* denotes significance at least at 10% and \*\* denote that at 1% or lower level.



**Table A6. Average share of elderly in sample households**

	Proportion of elderly 55+	Proportion of elderly 60+	Proportion of elderly 75+
MPCE quintile 1	0.2801	0.2021	0.0276
MPCE quintile 2	0.3175	0.2317	0.0308
MPCE quintile 3	0.3329	0.2407	0.0313
MPCE quintile 4	0.3620	0.2638	0.0348
MPCE quintile 5	0.4303	0.3226	0.0494
Lowest MPCE decile	0.2736	0.1952	0.0277
Highest MPCE decile	0.4692	0.3529	0.0557

**Table A7. Poverty and death rates, NSS 60**

State	Household poverty likelihood			Mean death rates for 55+	
	With 60+	NO 60+	T-stat	Sample	Predicted
AP	0.12	0.11	1.070	0.012	0.0147
Assam	0.24	0.23	0.780	0.015	0.0127
Bihar	0.32	0.38	-3.984**	0.013	0.0145
Gujarat	0.14	0.18	-2.257*	0.008	0.0147
Haryana	0.09	0.08	0.783	0.014	0.0149
J&K	0.05	0.03	0.911	0.005	0.0126
Karnataka	0.19	0.23	-2.066*	0.009	0.0139
Kerala	0.15	0.12	1.703*	0.022	0.018
MP	0.24	0.30	-2.973**	0.018	0.014
Maharashtra	0.21	0.23	-0.912	0.016	0.015
Orissa	0.49	0.50	-0.482	0.016	0.0157
Punjab	0.06	0.10	-2.557*	0.03	0.0129
Rajasthan	0.18	0.22	-2.497*	0.02	0.015
Tamil Nadu	0.19	0.24	-2.872**	0.0089	0.013
UP	0.26	0.33	-5.971**	0.0139	0.015
WB	0.26	0.35	-5.138**	0.0198	0.0155

Note. A household is considered to be poor if its average per capita monthly expenditure (APCE) is less than the state poverty line in 1995. Poverty likelihood is then calculated as the simple proportion of total households living with/without elderly of different categories 60+, 65+ and 75+. We also compute the corresponding t-statistics for comparison of the proportions of households with and without elderly.