OLD AGE POVERTY IN THE INDIAN STATES: WHAT DO THE HOUSEHOLD DATA TELL US?

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Abstract: In the absence of any official measures of old age poverty, this paper uses National Sample Survey household-level data to investigate the extent and nature of living standards and incidence of poverty among elderly in sixteen major states in India. We construct both individual and household-level poverty indices for the elderly and examine the sensitivity of these poverty indices to different equivalence scales and size economies in consumption. Our analysis highlights the complex nature of old age poverty in the Indian states. While poverty estimates taking into account equivalence scale and size economies in consumption suggest that households with elderly members are less poor than others, the interpretation of this result is more complex. Further analysis suggests that the results are partly a function of differences in demographic composition of the households and a possible survivorship bias due to positive correlation between household incomes and life expectancy. After correcting for the possible sources of bias (including the survivorship bias), there is evidence that poverty is increased by the presence of older elderly (75 and above) in all states. Meanwhile, the conclusion that households with elderly aged sixty and above are less poor appears to be robust across most states.

JEL classification: J14, I31

Key words: Old age poverty, Living standards, Poverty indices, Equivalence scale, Size economies in consumption, Social protection of the elderly, Elderly contribution, Surviorship bias.

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1. Introduction

Like most developing countries, India's population has been ageing due to a substantial decline in both fertility and mortality over the past fifty years. This phenomenon has important implications for poverty reduction strategies. Although demographic (Visaria, 1998) and other socio-economic and health (Prakash, 1999; Rajan et al. 1999) aspects of ageing in India have been examined by various social scientists, there are no official measures of old age poverty in India (as in many other developing countries, e.g., Subbarao et. al. 2005, Barrientos et al. 2003). With the exception of Deaton and Paxson (1995), who provide estimates of old age poverty in six large Indian states for 1987-88, there has been a general lack of research into an understanding of the extent, magnitude and nature of old age poverty in the Indian states.

In an attempt to fill this gap in the literature, this paper examines the inter-state disparity in living standards and incidence of poverty among elderly persons in India. The analysis is based on the fifty-second round (1995-96) National Sample Survey (NSS) household-level data. 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.[1] In particular, we consider the distribution of average monthly per capita consumption expenditure (APCE) and poverty head count ratio (HCR)[2] among households with and without elderly members across sixteen major states in India. We also compare our poverty head count ratio estimates with the Deaton and Paxson poverty estimates for the six states common in both studies. Since these two sets of

[1] See Pal (2004) for further details of the data.
[2] These poverty counts are counts of individuals in poverty as calculated from household-level APCE and state specific poverty lines in 1995-96. In addition, we calculate poverty gap and squared poverty gap indices.

poverty estimates turn out to be quite comparable, the rest of our analysis makes use of the former approach.[3]

The official poverty measures in India do not take account of differences in households with different demographic composition. We, however, examine the sensitivity of APCE as well as poverty HCR to different weights for equivalence scale and size economies in consumption. Our analysis distinguishes any elderly (aged sixty and above) from the older elderly members (aged 75 and above) of the household. In general there is indication that households with elderly are not worse off in most states, even when we consider the adjusted measures of living standards. There is however evidence that these results could be misleading because of the presence of survivorship bias (resulting from the close correlation between household income/expenditure and presence of elderly) as well as problems of endogeneity. Even after correcting for these possible problems, our results suggest that households with *any* elderly are better off in many states of India while households with *older* elderly could be worse off. The paper concludes with a brief summary and shortcomings of our findings and implications for future research.

2. Estimates of relative living standards and poverty incidence

The 52nd round NSS survey 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.

[3] Our poverty rates for the year 1995-96, though comparable, are slightly lower than the Deaton and Paxson estimates for the six states available for the year 1987-88. In addition to the effect of income growth over this period, the latter could be attributable to the fact that their estimates are based on an all-India poverty line rather than the state-level poverty lines that we use in our study.

2.1. Estimates of unadjusted living standards

Table 1 summarises the key sample properties in the selected Indian states. On an 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. Average household size also varies with Kerala at 4.9 and UP with more than six members per household compared to a national average of 5.34.

We consider average per capita monthly consumer expenditure (APCE) as an indicator of standard of living that is widely used in the literature and compare the case of any elderly (aged sixty and above) from the older elderly often defined (although arbitrarily) 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.

Table 2A summarises the state-level mean APCE for households with and without elderly of a particular type. The table also includes the independent sample t-statistics for comparison of mean APCE for these two groups of households in each case (any elderly and older elderly). This comparison yields a mixed picture in that it indicates that households with elderly (of a given type) could be significantly better or worse of in a given state though in more cases households with elderly are better off. We also note that this result is also contingent on the particular definition of elderly (any as opposed to older elderly).

Next, we compare the poverty rates between households with and without elderly members. 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,[4] we construct the poverty index for the s-th state P_{s0}, s = 1,2,….16 as follows:

$$P_{s0} = \frac{1}{n}\left(\frac{\sum_{i=1}^{q}(z_s - x_{si})}{z_s} \right) \qquad (1)^{5}$$

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.

Deaton and Paxson (1997) however 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 (1997), we also compute these individual-specific poverty head count ratios for elderly and non-elderly people in all the selected states (see Table 2B). Clearly both individual and household specific poverty head count ratios are quite comparable for all the Indian states in our study. It is however evident that compared to 1987-88, poverty rates are generally lower in

[4] 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.

[5] We could modify this equation to derive the poverty gap and the squared poverty gap indices.

1995-96 for these six states studied by Deaton and Paxson. 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. But as with Deaton and Paxson (1997), our poverty head count ratios are generally lower for the elderly or the population living with the elderly.

Table 2C shows some additional poverty indices, namely, poverty gap and squared poverty gap, for these two groups of population living with and without the elderly. These additional poverty indices too confirm that the incidence of poverty is similar or lower among the population living with the elderly, with the exception of Kerala. The rest of the paper however focuses on the household-specific poverty head count ratio.

2.2. Estimates of adjusted living standards

Our results presented in section 2.1 could however be 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. This section will therefore examine the sensitivity of the indicators of standard of living and poverty head count ratio to differences in age/sex composition of the household members as well as size economies in consumption.

2.2.1. Equivalence scales

Use of APCE to compare different groups of households is problematic since it ignores differences in household age-sex composition (e.g., % of adult/child, male/female etc.). A conventional way of addressing this difficulty is to make use of the equivalence scales that allow us to give different weights to household members in different age/sex composition. Here we examine the sensitivity of the scale adjusted APCE 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).[6]

The adjusted APCE estimates shown in Table 3A for the major Indian states in our sample shows that these adjusted APCE estimates are higher for households with older persons in all the states, irrespective of the weights chosen. Next using equation (1) we calculate the estimates of equivalence scale adjusted poverty HCR for the selected states. These estimates as summarised in Table 3B mirror those of the adjusted APCE estimates. In particular, as with adjusted APCE estimates, equivalence scale adjusted poverty head count ratios are in general lower in households with elderly persons and this holds irrespective of the choice of weights.

2.2.2. Size economies in consumption

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 θ is a parameter lying between 0 and 1.

If θ = 1, there are no economies of scale (y is the per capita expenditure) and if θ = 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. We have considered 4 possible intermediate values of θ, 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. Economies of scale adjusted APCE estimates are shown in Table 4A. As with equivalence scale adjusted APCE, economies of scale adjusted APCE figures too are higher for households with elderly members in all the selected states irrespective of the choice of weights.

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,…,K. For θ =1, this is the conventional head-

[6] These choice of weights closely follow those chosen by Drèze and Srinivasan (1997).

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:

$$z^s(\theta) \equiv z^s(1) m_s^{1-\theta} \qquad (2)$$

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 θ, S=1,2,…K. For consistency with the earlier calculations of HCR, we take $z^S(1)$ to be the state-specific poverty line expenses. These adjusted HCR measures are shown in Table 4B. Again, incidence of poverty is lower in households with elderly members in all the sample states.

2.3. Incidence of Poverty among older elderly

In order to examine the vulnerability of the older elderly, we next repeat the exercise conducted in subsections 2.2.1 and 2.2.2 for households with and without elderly aged 75 and above. These estimates are summarized in Tables 3C and 4C respectively for equivalence scale and size economies of scale adjustments. While size economies of scale adjusted hcr measures indicate that households with older elderly (75+) have lower levels of poverty, equivalence scale adjusted HCR measures yields less clear conclusions, although in most cases, the poverty rates are similar or lower for the households with the very old.

3. Factors affecting living standards

It thus follows that households with any elderly (even those with older elderly) tend to be better off in most states in our sample, even when we compare the adjusted measures of living standards. In this section we explore the possible underlying factors explaining this general trend.

We start by comparing the demographic composition of these two groups of households, households with and without elderly members (60+ or 75+). It follows 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.[7] 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 described in Tables 5A and 5B respectively. We also compute the independent sample t-statistics for comparison of means of household size and dependency ratio between these two groups of households. 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. In other words, the elderly members of the household, especially the male members, continue to contribute to the family financially (and otherwise) well into their old age (see Pal, 2006); the latter is likely to explain why the dependency ratio tends to be lower in households with elderly.

In this context, it is worthwhile to examine the sensitivity of our results presented in section 2 to inclusion of these demographic differences between these two groups of households. One way of approaching this problem would be to do a multivariate regression analysis to determine the two indicators of living standards used in this paper: (a) APCE and (b) incidence of poverty, separately for each sample state. The set of covariates would include households size, square of household size (in an attempt to account for possible non-linear effect of household size on (a) and (b)), dependency ratio, presence of an elderly member and also ethnic composition of

[7] 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.

the household (e.g., scheduled caste, scheduled tribe or religion). We however need to carefully choose these explanatory variables as some of these variables could be closely correlated with each other and/or with the dependent variable APCE as well; thus if we are not careful our estimates could be seriously biased. For one thing, presence of elderly in a household is likely to be correlated with APCE due to a survivorship bias. It may well be the case that elderly persons are more likely to be present in wealthier households simply because other members of their cohort living in lower income households tend to die earlier. In order to check this, we ran a very simple log-linear logit relationship to determine the presence of elderly persons (60+ and 75+) in each of the sample states and did find some evidence of survivorship in most states (see Appendix Table A1). Since we are interested in assessing the extent to which the presence of an elderly person increases or reduces poverty, we want to exclude this survivorship bias. In an attempt to do so, we introduce an instrument, namely, the dependency ratio, which is highly correlated to the presence of elderly, by definition. We however abstain from using dependency ratio as a possible additional covariate as family size and dependency ratio are highly correlated (larger families tend to have higher dependency ratio), giving rise to the problem of multicollinearity. These adjustments allow us to estimate a parsimonious model to determine APCE as well as poverty incidence, with a view to minimize the extent of bias in our estimates. In particular, we use two stage least squares (2SLS) method to estimate APCE while given the binary nature of the poverty incidence variable[8], we obtain logit estimates of this incidence variable, where presence of elderly is instrumented by the relevant dependency ratio.[9] Corrected effects of the presence of elderly on APCE and incidence of poverty are shown in Table 6A and 6B respectively for all elderly and

[8] A household is defined to be poor if its APCE is less than the state-specific poverty line. Thus the resultant variable would take a value 1 if the household is poor (according to the above definition) and zero otherwise.

[9] We have also tried to use alternative instruments for presence of elderly members, for example, a predicted value of this variable (presence of elderly 60+ or 75+) determined by using household APCE as the explanatory variable. Irrespective of the choice of instruments, we obtained rather similar results. Uncorrected estimates of APCE and poverty incidence for older elderly are shown in the Appendix Tables A2 and A3.

older elderly members of households. We also compare these estimates with the corresponding uncorrected ones shown in Appendix Tables A2 and A3 respectively.

While the uncorrected effects of the presence of elderly tends to vary from one state to another, corrected estimates shown in Table 6B suggest that APCE is significantly lower in households with older elderly 75+ in all sample states. This is further highlighted in column (2) of Table 6B that the incidence of poverty is significantly higher in households with older elderly. In each state all other explanatory variables, namely, household size, its square and binary variables for SC and ST are significant and have similar effects on APCE. In particular, coefficient of household size in determining APCE is negative, that of its square is positive and those for SC and ST are each negative. These effects are also reflected in the estimates of poverty incidence so that after controlling for all other factors, presence of an older elderly is associated with higher poverty in all the sample states considered. It is also interesting to compare the effects of older elderly with those of all elderly in the sample states (compare Tables 6A and 6B); the latter indicates that the result is dependent on the particular state of our choice. In contrast to the results for older elderly, there is indication that APCE is significantly higher (and therefore incidence of poverty lower) in households with all elderly members (old60) in some nine out of sixteen states (though the size of these effects varies among the states). The result however remains insignificant for the other states. This difference in results between these two groups of households (i.e., with all elderly and with older elderly) could be attributed to the differential participation rates of these two groups of elderly (see Table 5A and 5B).

4. Policy implications and scope for future research

Our analysis suggests that elderly households were not more likely to be poor than other households in any state in India during the mid-1990's. This general result holds under different assumptions about adult equivalence and scale economies. This would seem to weaken the case for categorical targeting of the elderly for anti-poverty programs.

However, part of the story appears to be due to a survivorship bias whereby fewer individuals survive to old age among the lower income brackets. This implies some causal flow from income to the presence of elderly in the household and has several important implications. First, it may hint at the possibility that intra-household allocation of consumption is biased towards the young among those at subsistence levels.[10] Second, to the extent that minimum levels of health are achieved for a larger proportion of the adult population, this survivorship bias may be reduced over time. As in Kerala, this would be a positive outcome but would show up in the data as an increasing share of poor elderly. Finally, it raises the possibility of some endogeneity involved in making cash transfers to the poor elderly. If these transfers help reduce elderly mortality without lifting them above the poverty line, the result will be more old poor people. If the transfer adds to consumption without increasing life expectancy, it will reduce the number of poor elderly. Assuming that the life expectancy impact per rupee is greatest among the most destitute, the counterintuitive conclusion is that the better the program is targeted, the higher will be the number of elderly poor. This is obviously a positive outcome assuming that it is better to be poor and old than dead.

In addition to the potential mortality effect, cash transfers to the poor elderly may lead to other behavioral reactions. Private sources of support may be crowded out, for example, a possibility encouraged by some of the criteria used to determine eligibility in some programs. Labor supply may be reduced so that the overall consumption gain may be less than the transfer. These and other indirect effects have been documented in a number of countries.[11]

Another important consideration is the coverage of formal sector pension schemes. Arguably, where coverage is lower, social pensions may play a greater role in the overall system of income support for the elderly. Currently, only about one in ten workers in India is covered by a formal pension scheme and state coverage levels vary across states in direct correlation to

[10] Kochar (1997) provides rare empirical evidence of this bias in the case of medical expenditures in Pakistani households.

[11] For a review of the evidence, see Palacios and Sluchynsky (2006).

income per capita levels (Palacios 2006). International experience suggests that these pension schemes will not cover the majority of India's population for many decades.

In terms of existing programs targeted to the elderly poor in India, there is significant variation across states in terms of eligibility ages and benefit levels as summarised in Table 7. In fact, the differences in outlays and targeting efficiency of these state-level programs, which are in theory aimed at the poorest elderly, may help explain some of the inter-state differences in elderly poverty rates.[12] In 1995, the National Old Age Pension Scheme (NOAPS) was introduced. This central government program[13] supplements existing means-tested pension schemes administered at the state level. The number of beneficiaries of the NOAPS, which sets 65 as the eligibility age, was around seven million in 2001 with a payment of 75 rupees per month.[14] Research on the impact of non-contributory, state pension schemes and the newer NOAPS on poverty incidence of the elderly would help inform policymakers. [15]

In closing, the case for categorical targeting of the elderly depends on a variety of factors and should be viewed in a dynamic sense. The recommended policies for tackling elderly poverty will depend on how formal pension scheme coverage is expected to develop over time. It may also be useful to study and anticipate the impact of a reduction in adult mortality on the relative poverty rates of the elderly. More research is also needed on intra-household allocation of resources and other private intergenerational transfers. Finally, the high growth rates experienced over the last decade may themselves act to structurally change the relative position of elderly

[12] A case study for the program in Uttar Pradesh found major leakages and diversion of funds (HelpAge (2003)). The World Bank is conducting research on the program in Karnataka and Tamil Nadu.
[13] The Ministry of Rural Development oversees the program.
[14] See Rajan (2004).
[15] Note that the formula used to allocate resources for the NOAPS to states assumes that elderly poverty rates are the same as those for all households. The program allocates funds for one half of the estimated number of poor elderly based on this assumption times the benefit level of 75 rupees. Alam (2004) correctly points out the arbitrary nature of this formula, but assumes that the target figure should always be higher. Our results suggest that except for Kerala, the formula would produce a figure greater than the number of households with an elderly member falling below the poverty line. A more significant problem in our view is the low disbursement rate in many states.

households. It would be useful therefore, to update the results presented here and analyze the reasons for any trends that emerge.

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Table 1. Selected sample characteristics

	Number of households			Number of individuals		
States	**Without old >=60 years**	**With old >=60 years**	**Total**	**Total popn [2]**	**popn. living with old**	**Average family size**
AP	4025	932	4957	22705	0.21	5.34
Assam	2626	661	3287	17452	0.26	5.31
Bihar	5249	1419	6668	38819	0.26	5.82
Gujarat	1926	568	2494	13710	0.25	5.5
Haryana	774	291	1065	6272	0.31	5.89
J&K	1461	484	1945	11538	0.40	5.93
Karanataka	1939	619	2558	14366	0.30	5.62
Kerala	1798	1052	2850	13990	0.43	4.91
MP	4085	1076	5161	28822	0.26	5.58
Maharashtra	3019	1267	4286	22458	0.34	5.24
Orissa	2387	832	3219	16301	0.32	5.06
Punjab	1666	561	2227	12592	0.30	5.65
Rajasthan	2497	615	3112	17594	0.24	5.65
Tamilnadu	3417	821	4238	17856	0.21	4.21
UP	6215	2436	8651	52292	0.33	6.04
WB	3701	911	4612	24095	0.24	5.22
All India [1]	54927	16357	71284	380885	0.27	5.34

Note:[1] 52nd round NSS also includes households from other Indian states as well. [2] This is simply the sum total of all household members in a state.

Table 2A. Comparison of Mean APCE between households with and without elderly members

	With old 60+	Without old 60+	With old 75	Without old 75+
AP	323.8	308.5	323.8	311.0
T-stat [1]	2.352**		0.958	
Assam	313.3	312.4	345.3	311.7
T-stat	0.189		2.177*	
Bihar	282.4	275.7	297.7	276.3
T-stat	1.855*		2.599**	
Gujarat	228.0	193.7	406.6	394.6
T-stat	2.130*		0.772	
Haryana	461.9	479.7	435.1	477.9
T-stat	-0.764		-1.758*	
J&K	402.7	438.7	359.3	433.5
T-stat	-4.075**		-4.604**	
Karnataka	331.4	330.9	370.8	329.4
T-stat	0.054		2.144*	
Kerala	455.7	503.2	460.5	488.4
T-stat	-3.342**		-1.557	
MP	314.8	305.0	321.2	306.4
T-stat	1.938*		0.932	
Maharashtra	345.1	342.5	363.7	342.1
T-stat	0.439		1.606	
Orissa	279.1	272.2	293.3	272.9
T-stat	1.315		2.278*	
Punjab	549.0	512.3	548.9	519.3
T-stat	2.774**		1.382	
Rajasthan	378.4	389.9	378.3	388.1
T-stat	-1.743*		-0.809	
Tamil Nadu	341.5	336.4	339.2	337.3
T-stat	0.818		0.142	
UP	330.3	325.6	320.8	327.3
T-stat	1.132		-1.017	
West Bengal	334.5	301.9	145.0	136.3
T-stat	5.820**		3.891**	
All India	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 do not assume equal variances for the two sub-samples.

TABLE 2B. Household and individual level rural poverty head-count ratio (unadjusted)

	Household-level poverty hcr					**Individual level poverty hcr**			
	Our estimates 1995-96					Our estimates 1995-96		Deaton & Paxson estimates 1987-88	
STATES	All [1]	With old 60+	No old 60+	With 75+	Without 75+	Elderly 60+	Non-elderly 60+	Elderly	Non-elderly
AP	0.20	0.18	0.20	.15	.16	0.17	0.20		
Assam	0.47	0.45	0.49	.36	.43	0.40	0.48		
Bihar	0.56	0.52	0.58	.42	.52	0.45	0.57		
Gujarat	0.21	0.20	0.21	.13	.18	0.16	0.21	0.31	0.43
Haryana	0.18	0.15	0.19	.16	.15	0.13	0.18		
Karanataka	0.32	0.32	0.31	.24	.25	0.23	0.32	0.49	0.54
Kerala	0.15	0.18	0.14	.14	.12	0.15	0.15	0.26	0.31
MP	0.36	0.33	0.37	.30	.31	0.28	0.36	0.55	0.62
Maharashtra	0.28	0.28	0.28	.18	.23	0.21	0.29	0.49	0.54
Orissa	0.48	0.41	0.51	.34	.44	0.39	0.49		
Punjab	0.09	0.06	0.11	.05	.09	0.05	0.10		
Rajasthan	0.20	0.20	0.20	.17	.16	0.17	0.20		
Tamilnadu	0.29	0.29	0.29	.24	.24	0.23	0.30	0.50	0.55
UP	0.44	0.42	0.45	.37	.38	0.37	0.44		
WB	0.49	0.41	0.52	.34	.45	0.37	0.50		

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.

TABLE 2C. Other household-level rural poverty indices (unadjusted)

	Population living with elderly 60+		Population living without elderly 60+	
STATE	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
Karanataka	.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 3A. Equivalence scales adjusted APCE , elderly 60+

	Households with old 60+			Households without old 60+		
States	(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	471.9	516.7	567.6	409.0	448.9	492.6
Assam	531.5	572.1	626.5	401.1	431.5	471.7
Bihar	496.8	535.8	590.2	388.4	421.9	465.1
Gujarat	601.2	654.4	718.4	520.4	565.6	618.8
Haryana	730.8	783.8	857.7	601.7	646.8	710.7
J&K	695.1	743.3	814.3	565.4	606.1	663.2
Karanataka	582.8	639.4	702.2	422.7	461.5	507.3
Kerala	684.2	749.6	819.1	590.2	650.3	714.7
MP	554.4	598.8	656.0	407.8	441.0	483.3
Maharashtra	544.6	598.9	660.1	450.3	492.5	540.8
Orissa	492.7	535.8	588.8	361.1	392.4	428.9
Punjab	921.6	997.3	1091.6	649.3	700.4	765.3
Rajasthan	645.9	695.7	765.1	529.7	571.3	627.1
Tamilnadu	478.0	527.9	578.3	440.2	486.3	532.4
UP	586.4	631.7	691.6	451.0	486.2	532.4
WB	566.5	613.2	675.3	390.4	423.6	465.0
All India	588.6	638.3	700.0	464.2	503.2	551.2

Note: It clearly follows that the equivalence scale adjusted APCE is higher for households with older persons in all states, irrespective of the weights chosen.

TABLE 3B. Equivalence scale adjusted poverty head count ratio, elderly 60+

	Households with elderly 60+			Households without elderly 60+		
STATES	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	.02	.15	.12	.09
Assam	.06	.05	.04	.31	.26	.21
Bihar	.06	.06	.04	.32	.29	.24
Gujarat	.03	.02	.02	.16	.14	.12
Haryana	.04	.04	.03	.15	.12	.09
Karanatak	.06	.04	.03	.22	.19	.15
Kerala	.08	.06	.04	.15	.11	.08
MP	.04	.03	.03	.24	.21	.18
Marras	.06	.05	.04	.21	.18	.14
Orissa	.08	.06	.05	.34	.30	.24
Punjab	.02	.02	.01	.12	.10	.08
Rajasthan	.03	.02	.02	.16	.13	.10
Tamilnadu	.04	.03	.03	.20	.17	.13
UP	.08	.07	.06	.27	.24	.19
WB	.05	.04	.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 3C. Equivalence Scale (ES) adjusted estimates of poverty HCR, elderly 75+

	ES Adjusted: Households with 75+			ES adjusted Households without 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	.22	.18	.15	.21	.18	.14
Assam	.24	.19	.14	.35	.30	.25
Bihar	.25	.22	.20	.40	.37	.31
Gujarat	.20	.18	.15	.21	.19	.16
Haryana	.20	.18	.17	.18	.15	.12
Karnataka	.15	.12	.09	.26	.23	.19
Kerala	.15	.13	.11	.18	.14	.11
MP	.16	.13	.10	.30	.27	.23
Maharashtra	.17	.15	.13	.26	.23	.19
Orissa	.23	.19	.13	.40	.35	.30
Punjab	.10	.09	.08	.15	.13	.10
Rajasthan	.14	.13	.12	.21	.19	.15
Tamilnadu	.29	.26	.20	.27	.23	.19
UP	.26	.22	.19	.34	.30	.26
WB	.21	.18	.15	.36	.32	.27

TABLE 4A. Size economies of scale adjusted APCE, elderly 60+

	Households with elderly members 60+				Households without elderly members 60+			
	Choice of size economies				Choice of size economies			
State	0.8	0.6	0.4	0.2	0.8	0.6	0.4	0.2
AP	429.3	578.1	789.8	1094	402.8	530.8	705.6	945.7
Assam	448.2	647.0	941.5	1381	420.8	571.1	780.5	1073
Bihar	403.1	584.1	858.0	1276	374.9	515.6	716.9	1007
Gujarat	564.6	785.6	1109	1587	526.9	718.5	988.8	1372
Haryana	658.4	948.3	1379	2023	658.9	911.9	1271	1783
J&K	581.3	848.1	1250	1858	603.2	835.6	1165	1636
Ktaka	464.7	661.6	955.2	1397	441.5	595.5	811.5	1117
Kerala	622.1	858.6	1197	1686	654.5	859.0	1137	1516
MP	442.3	632.5	918.4	1353	410.8	559.4	769.3	1068
Maharra	469.5	649.8	913.4	1302	455.3	610.9	826.9	1128
Orissa	387.5	546.5	781.5	1132	356.9	473.8	636.2	863.3
Punjab	782.7	1128	1642	2411	696.4	954.6	1319	1835
Rajasthan	532.8	761.4	1103	1616	527.1	720.4	994.5	1386
Tamilnadu	441.0	578.1	768.9	1036	433.6	564.1	740.0	978.4
UP	465.3	667.9	974.8	1445	443.5	611.2	851.5	1198
WB	467.4	661.6	947.9	1374	404.2	545.9	743.4	1020
All India								

Note: We find that scale adjusted APCE is always higher among households with older persons.

Table 4B: Size economies of scale adjusted poverty head count ratio, elderly 60+

	With old 60+				Without old 60+			
	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
Assam	0.12	0.1	0.08	0.07	0.48	0.47	0.46	0.49
Bihar	0.16	0.13	0.11	0.1	0.55	0.54	0.53	0.57
Gujarat	0.05	0.04	0.04	0.04	0.18	0.19	0.2	0.19
Haryana	0.06	0.05	0.05	0.05	0.19	0.19	0.2	0.19
Karanata	0.1	0.08	0.07	0.06	0.3	0.29	0.3	0.3
Kerala	0.1	0.07	0.06	0.06	0.11	0.12	0.14	0.12
MP	0.08	0.07	0.06	0.05	0.36	0.36	0.36	0.36
Marras	0.1	0.08	0.07	0.07	0.26	0.26	0.27	0.26
Orissa	0.14	0.12	0.11	0.11	0.5	0.5	0.5	0.51
Punjab	0.02	0.02	0.02	0.02	0.11	0.12	0.14	0.1
Rajasthn	0.04	0.03	0.03	0.03	0.17	0.18	0.2	0.17
Tnadu	0.07	0.05	0.05	0.05	0.23	0.22	0.22	0.26
UP	0.17	0.14	0.12	0.12	0.41	0.41	0.41	0.42
WB	0.11	0.09	0.08	0.07	0.5	0.48	0.47	0.51

Table 4C: Size economies of scale adjusted poverty head count ratio, elderly 75+

	Households with elderly 75+				Households without elderly 75+			
	0.8	0.6	0.4	0.2	0.8	0.6	0.4	0.2
AP	.15	.13	.14	.16	.2	.21	.24	.27
Assam	.34	.26	.19	.16	.5	.44	.42	.41
Bihar	.35	.29	.26	.23	.5	.51	.49	.48
Gujarat	.11	.09	.09	.09	.2	.18	.17	.18
Haryana	.14	.13	.12	.10	.2	.17	.17	.18
Karnataka	.18	.15	.12	.12	.3	.27	.26	.26
Kerala	.11	.08	.09	.09	.1	.11	.10	.12
MP	.22	.18	.15	.13	.3	.32	.32	.32
Maharashtra	.13	.09	.10	.09	.2	.24	.23	.23
Orissa	.21	.17	.16	.15	.5	.44	.44	.43
Punjab	.05	.04	.06	.05	.1	.10	.10	.11
Rajasthan	.15	.10	.07	.08	.2	.15	.17	.18
Tamilnadu	.22	.17	.18	.18	.3	.23	.22	.22
UP	.34	.27	.20	.18	.4	.38	.37	.36
WB	.26	.20	.19	.16	.5	.45	.44	.42

Table 5A. A Comparison of demographic composition of households with and without elderly members 60+

	Household size		Dependency ratio		Current economic participation rate among
	With old 60+	Without old 60+	With old 60+	Without old 60+	Among elderly 60+
AP	5.14	4.45	0.25	0.35	0.39
	6.933**		12.616**		
Assam	6.75	4.95	0.29	0.38	0.32
	14.300**		10.664**		
Bihar	7.16	5.46	0.37	0.41	0.43
	15.566**		6.329**		
Gujarat	6.14	5.31	0.29	0.35	0.34
	5.913**		5.018**		
Haryana	6.75	5.57	0.35	0.40	0.24
	6.017**		3.639**		
J&K	7.19	5.52	0.33	0.38	0.43
	10.563**		5.129**		
Karanataka	6.94	5.19	0.31	0.36	0.38
	10.309**		4.773**		
Kerala	5.73	4.43	0.28	0.29	0.30
	14.143**		1.364		
MP	6.84	5.25	0.33	0.39	0.40
	13.360**		8.909**		
Maharashtra	6.01	4.92	0.31	0.37	0.44
	11.034**		8.228**		
Orissa	6.19	4.67	0.30	0.35	0.38
	11.894**		5.992**		
Punjab	6.73	5.29	0.33	0.36	0.24

	10.131**		2.293*		
Rajasthan	6.72	5.39	0.36	0.41	0.38
	9.022**		4.868**		
Tamil Nadu	4.47	4.15	0.23	0.30	0.47
	3.601**		7.609**		
UP	7.08	5.64	0.35	0.42	0.42
	15.694**		11.419**		
WB	6.39	4.94	0.29	0.39	0.35
	12.720**		12.074**		
All India	6.38	5.03	0.31	0.37	0.39
	46.631**		30.388**		

Table 5B. A Comparison of demographic composition of households with and without older elderly members 75+

	Household size		Dependency ratio		Current economic participation rate among
	With old 75+	Without old 75+	With old 75+	Without old 75+	elderly 75+
AP	5.53	4.56	0.47	0.32	0.17
T-Statistic[1]	3.568**		8.329**		
Assam	4.15	2.24	0.45	0.36	0.09
T-Statistic	4.170**		4.021**		
Bihar	7.88	5.74	0.55	0.39	0.26
T-Statistic	7.767**		14.02**		
Gujarat	6.33	5.46	0.48	0.33	0.28
T-Statistic	2.689**		7.839**		
Haryana	7.03	5.80	0.51	0.37	0.06
T-Statistic	3.482**		5.990**		
J&K	7.42	5.85	0.51	0.36	0.19
T-Statistic	4.581**		8.049**		
Karanataka	7.48	5.53	0.47	0.34	0.17
T-Statistic	3.835**		7.205**		
Kerala	5.68	4.83	0.45	0.27	0.12
T-Statistic	5.315**		14.789**		
MP	7.35	5.51	0.49	0.37	0.17
T-Statistic	7.089**		9.473**		
Maharashtra	6.36	5.17	0.47	0.34	0.16
T-Statistic	5.645**		8.892**		
Orissa	6.61	4.98	0.49	0.33	0.09
T-Statistic	6.050**		11.081**		
Punjab	6.76	5.56	0.48	0.34	0.07
T-Statistic	4.888**		8.568**		

Rajasthan	7.28	5.58	0.55	0.39	0.15
T-Statistic	5.368**		10.035**		
Tamilnadu	4.57	4.20	0.48	0.28	0.23
T-Statistic	1.863*		11.859**		
UP	7.78	5.93	0.53	0.39	0.23
T-Statistic	9.223**		16.541**		
WB	6.38	5.18	0.46	0.36	0.15
T-Statistic	4.618**		7.660**		
All India	6.75	5.27	0.49	0.35	0.17
T-Statistic	22.667**		40.833**		

[1] This is the independent sample t-test for comparison of means between households with and without an elderly member aged 75 and above.

Table 6A. Corrected estimates of presence of all elderly 60+

	2SLS estimates of APCE		Logit instrumented estimates of poverty incidence	
	Coefficient of old60+	F-stat	Coefficient of old60+	Chi-square
AP [1]	0.03*	129.3**	0.03	365.8**
Assam	0.05*	39.2**	-0.07**	121.4**
Bihar	0.03*	134.1**	-0.3**	509.5**
Gujarat	0.03	80.7**	-0.28	258.0**
Haryana	0.01	7.9**	-0.14	87.5**
J&K	-0.03	43.2**	-	-
Karnataka	0.05*	78.7**	-0.35	252.9**
Kerala	0.06**	72.4**	0.04	158.0**
MP	0.03**	282.6**	-0.46**	778.9**
Maharashtra	0.02	170.6**	-0.25*	435.2**
Orissa	0.02	150.6**	-0.29*	601.6**
Punjab	0.05**	90.9**	-0.73*	149.6**
Rajasthan	0.002	102.5**	0.03	306.2**
Tamilnadu	0.03*	124.5**	-0.44*	448.1**
UP	0.01	184.2**	-0.14*	645.8**
WB	0.11**	103.0**	-0.67**	329.7**
All India [2]	0.03**	1310.8**	-0.21**	4299.0**

Note: [1] Other control variables include family size, its square and two binary variables for scheduled caste and scheduled tribe households. [2] Here, in addition to other control variables as noted in [1], we control for regional dummies as well. '*' denotes significance at 10% and '**' denote that at 1% or lower level.

Table 6B. Corrected estimates of presence of older elderly 75+

	2SLS estimates of APCE		Logit instrumented estimates of poverty incidence	
	Coefficient of old75+	F-stat	Coefficient of old75+	Chi-square
AP [1]	-0.30**	19.31**	0.65**	591.9**
Assam	-0.39**	22.28**	0.50**	251.4**
Bihar	-0.86**	76.13**	0.35**	811.5**
Gujarat	-0.18**	23.27**	0.27**	332.5**
Haryana	-0.14**	9.65**	0.37**	141.6**
J&K	-0.10**	23.29**	-	-
Karnataka	-0.32*	8.50**	0.53**	366.4**
Kerala	-0.23**	52.81**	0.19**	172.2**
MP	-0.18**	32.45**	0.41**	881.1**
Maharashtra	-0.32*	9.12**	0.41**	603.7**
Orissa	-0.16**	17.77**	0.55**	688.9**
Punjab	-0.15**	25.12**	0.46**	173.8**
Rajasthan	-0.15**	33.57**	0.45**	379.4**
Tamilnadu	-0.75**	89.85**	0.42**	557.5
UP	-0.25**	19.22*	0.28**	892.8
WB	-0.24**	14.93**	0.65**	732.7**
All India [2]	-0.18**	393.1**	0.38**	6026.8**

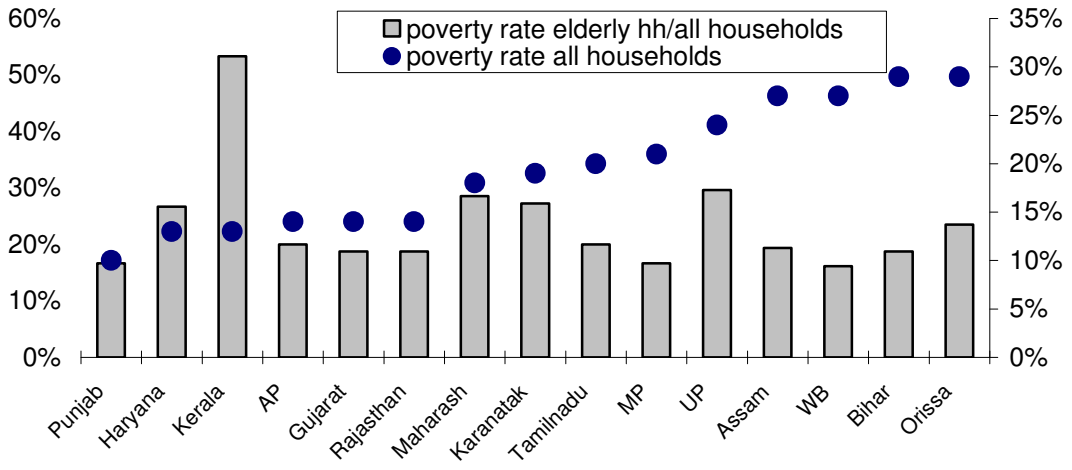
Note: [1] Other control variables include family size, its square and two binary variables for scheduled caste and scheduled tribe households. [2] Here, in addition to other control variables as noted in [1], we control for regional dummies as well. '*' denotes significance at 10% and '**' denote that at 1% or lower level.

Table 7. Old Age Pension amounts given by different States

Name of the State	Current amount of Pension (Rs. p.m.)	Minimum Age of Eligibility (in Yrs.)
Andhra Pradesh	75	65
Arunachal Pradesh	150	60
Assam	60	65 (males) 60 (females)
Bihar	100	60
Gujarat	200 275	60 to 65 65 +
Haryana	100	60
Himachal Pradesh	150	60
Jammu & Kashmir	125	60
Karnataka	100	65
Kerala	110	65
Madhya Pradesh	150	60 (males) 50 (females)
Maharashtra	100	65 (males) 60 (females)
Mizoram	100	65 (males) 60 (females)
Orissa	100	65
Punjab	200	65 (males) 60 (females)
Rajasthan	200 300	58 (males) 55 (females)
Tamil Nadu	150	60
Uttar Pradesh	125	60
West Bengal	300	60
Chandigarh	200	65 (males) 60 (females)
Delhi	200	60

Source: Help Age India : http://www.helpageindia.org/scg2.php

Figure 1


poverty rate elderly hh/all households
poverty rate all households
60%
50%
40%
30%
20%
10%
0%
35%
30%
25%
20%
15%
10%
5%
0%
Punjab
Haryana
Kerala
AP
Gujarat
Rajasthan
Maharash
Karanatak
Tamilnadu
MP
UP
Assam
WB
Bihar
Orissa

Appendix

Table A1. Is there a survivorship bias? Logit estimates of elderly presence

	Dependent variable	
	Presence of elderly 60+	Presence of elderly 75+
AP [1]	-2.554**+0.19*(LAPCE)	-5.139**+0.27(LAPCE)
Assam	-1.870**+0.09*(LAPCE)	-7.928**+0.75*(LAPCE)
Bihar	-2.710**+0.25**(LAPCE)	6.048**+0.51**(LAPCE)
Gujarat	-2.856**+0.28**(LAPCE)	-4.174**+0.29(LAPCE)
Haryana	-0.910+0.01(LAPCE)	-4.714**+0.29(LAPCE)
J&K	3.757**-0.81**(LAPCE)	7.415**-0.75**(LAPCE)
Karnataka	-1.218*+0.01(LAPCE)	-6.072**+0.51**(LAPCE)
Kerala	2.173**-0.45**(LAPCE)	-0.847-0.23(LAPCE)
MP	-2.71**+0.24**(LAPCE)	-3.942**+0.14(LAPCE)
Maharashtra	1.288**+0.07(LAPCE)	-4.954**+0.37**(LAPCE)
Orissa	-2.56**+0.39**(LAPCE)	-6.025**+0.57**(LAPCE)
Punjab	-3.492**+0.39**(LAPCE)	-4.58**+0.34*(LAPCE)
Rajasthan	-0.643-0.13(LAPCE)	-2.427*-0.11(LAPCE)
Tamilnadu	-1.78*+0.06(LAPCE)	-3.064**-0.03(LAPCE)
UP	-1.357**+0.07(LAPCE)	-2.592**-0.03(LAPCE)
WB	-5.112**+0.65**(LAPCE)	-8.287**+0.88**(LAPCE)
All India	-1.879**+0.12**(LAPCE)	-4.651**+0.283**(LAPCE)

Note: Here we present the logit estimates of presence of old (60+ and 75+) in terms of intercept and APCE coefficient estimates. Statistical significant of the relevant coefficients is indicated by '*' (at 10% level) and '**' (at 1% level). These regression uses natural logarithm of APCE (LAPCE) as the relevant variable.

Table A2. Uncorrected effects of presence of all elderly on APCE and poverty incidence

	OLS estimates of APCE		Logit estimates of poverty incidence	
	Coefficient of Old60+	F-stat	Coefficient of Old60+	LR chi-square statistic
AP [1]	0.04**	172.9**	-0.09	566.6**
Assam	0.08**	58.6**	-0.50**	412.3**
Bihar	0.05**	200.0**	-0.39**	970.4**
Gujarat	0.07**	128.3**	-0.25**	368.3**
Haryana	0.01	12.8**	-0.26	172.2**
Karnataka	0.08**	110.0**	-0.40*	356.8**
Kerala	0.01	53.0**	0.11	167.1**
MP	0.06**	309.2**	-0.41**	924.5**
Maharashtra	0.03*	223.6**	-0.20**	670.3**
Orissa	0.04*	156.4**	-0.28**	704.3**
Punjab	0.09**	97.2**	-0.54**	217.2**
Rajasthan	0.01	155.1	-0.12	348.9**
Tamilnadu	-0.01	140.0**	-0.02	526.5**
UP	0.04**	256.5**	-0.26**	993.2
WB	0.13**	191.6**	-0.45**	768.5**
All India [2]	0.04**	1527.8**	-0.24**	16243.6**

Note: [1] Other control variables include household size, its square and also binary variables for scheduled caste and scheduled tribe households. [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 A3. Uncorrected effects of presence of older elderly on APCE and poverty incidence

	OLS estimates of APCE		Logit estimates of incidence of poverty	
	Coeff of OLD75	F-stat	Coeff of OLD75	Chi-square
AP [1]	0.01	188.7**	-0.22	466.5**
Assam	0.06**	85.6**	-0.61**	182.1**
Bihar	0.03**	203.5**	-0.53**	758.4**
Gujarat	0.003	119.9**	-0.41	334.6**
Haryana	-0.02	12.01**	-0.09**	132.5**
J&K	-0.06**	45.8**	-	-
Karnataka	0.06**	120.7**	-0.39	295.3**
Kerala	-0.01	54.2**	-0.02	142.7**
MP	0.03**	279.4**	-0.18	839.5**
Maharashtra	0.05**	229.8**	-0.54**	576.4**
Orissa	0.03**	150.9**	-0.44**	631.9**
Punjab	0.03**	98.9**	-0.72**	155.2**
Rajasthan	0.01	132.6**	-0.26	325.9**
Tamilnadu	0.01	147.5**	-0.04	482.1**
UP	0.01	234.4**	-0.22**	817.4**
WB	0.05**	198.3**	-0.55**	591.9**
All India [2]	0.03**	1516.8**	-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.