Livestock, vulnerability, and poverty dynamics in India

Shaheen Akter, John Farrington, Priya Deshingkar and Ade Freeman

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Targeting and Innovation

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Shaheen Akter, John Farrington, Priya Deshingkar and Ade Freeman

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Acronyms and abbreviations

AP	Andhra Pradesh
ADB	Asian Development Bank
BC	Backward Caste
DF	Degrees of Freedom
CGIAR	Consultative Group on International Agricultural Research
CPI	Consumer Price Index
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GOI	Government of India
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
LDCs	Less Developed Countries
LOP	Livelihood Options Project
LS	Livestock
MDGs	Millennium Development Goals
NGO	Non-Governmental Organization
NSSO	National Sample Survey Organization
NRI	Natural Resources Institute
OC	Other Caste
ODI	Overseas Development Institute
SC	Scheduled Caste
SLU	Standard Livestock Unit
ST	Scheduled Tribe
WDR	World Development Report

Executive summary

This paper explores pathways out of poverty and vulnerability and discusses the role of livestock and livestock-based strategies in these pathways. A panel data set used for the study is drawn from the Livelihood Options Project (LOP) of the Overseas Development Institute (ODI) in London and its partners. This particular data set relates to the Indian State of Andhra Pradesh (AP). The study uses an income-based definition of poverty for quantitative analysis. The main conclusions drawn are:

- Poverty is declining but vulnerability, defined as the chance of movement into poverty, still remains strong. Although poverty incidence has gone down to 29% in 2006/07 from around 45% in 2001/02, more than 50% of households are still vulnerable. Pro-poor initiatives focusing on the mitigation of vulnerability along with poverty are necessary to sustain the downward trend.
- Poverty is still higher among schedule tribes (ST), schedule castes (SC), landless and marginal farms. This means that they should be the target groups of social protection programs.
- Incidence of poverty is higher in poorly-connected villages but vulnerability is higher in well-connected villages. This implies that anti-poverty policies should target poorly-connected villages to reduce poverty. Infrastructure development could be a priority strategy. Simultaneously well-connected villages should also be targeted to reduce vulnerability so that the chance of movement into poverty is reduced; otherwise the goal of longer-term poverty reduction cannot be achieved. Well-connected villages require different sets of policies which can raise as well as stabilize income of the people around and below the poverty threshold.
- The pathways out of poverty are not straight forward. Diversification of farm, non-farm and livestock appears to be the route that the majority of households pursue. However, among those who always remain with all these three types of activities, the probability of exiting poverty is less than among those who move between strategies with some degree of intensification/specialization/commercialization. Very few specialize in either farm or non-farm or livestock.
- Livestock is a common enterprise along with other farm and non-farm livelihoods; around 50% of the households hold one or another type of livestock or earn income from livestock-related occupations, either in-village or outside the village through migration or commuting. Although the income share earned from livestock directly is not high, livestock keepers obtain indirect benefits, such as the capacity of livestock to buffer against shocks. Livestock-related jobs are increasingly being taken up as migration and commuting expand. This indicates that livestock production may be expanding outside smallholder agriculture. It is important to identify any such developments so that training and other services can be targeted better towards the poor.
- Regression analysis shows that an increase in assets like owned land decreases the probability of being in poverty. A similar relationship is obtained for the covariates

such as schooling, primary and secondary education of head, migration route and agriculture–livestock route. Success is therefore conditional on access to resources; for those who are able to accumulate asset through regular savings or acquire them by some means, upward mobility is possible through either non-farm route or diversification of farm, livestock and non-farm activities.

- Livelihood pathways to exit poverty appear complex. For example, the prevalence of poverty was lower among farmers having livestock in 2001/02 but the trend reversed in 2006/07 for 2003/04 holders and the incidence was higher among the new holders in 2003/04. Prolonged drought is partially responsible but there may be other reasons for the failure of some commercial poultry farms which were relatively poorer. In the study locations, about 37% of the households which experienced decrease in livestock during 2001/02 to 2003/04 had to sell livestock due to domestic shock or stress, another 22% experienced decrease due to pest/disease problem, and 91% of the farm households which sold to meet major expenses failed to restock. Regression analysis shows that livestock keepers in 2001/02 were successful but the probability of becoming unsuccessful increases with the increase in stock in 2003/04. Livestock appear to be only a partial buffer against unforeseen expenses, especially where, as in the case of drought, the shocks experienced are co-variate. Another livestock survey is necessary to draw specific conclusions on pro-poor initiatives with livestock, because 2003/04 data were influenced by the drought, and so livestock related results are most likely to be a temporary phenomenon.

1 Introduction and background

Combating poverty is at the centre of MDGs and to achieve this goal nothing is more imperative than pro-poor initiatives in agriculture. Most of the poor in developing countries depend heavily on agriculture (WDR 2008). Hazel et al. (2007) argued that the majority of the poor in developing countries live in rural areas and live primarily on agriculture; this would not change in at least 20 years, even with urbanization. As an agricultural industry, the livestock sector is valued as one of the main global drivers of agriculture as well as one of the sectors having enormous potential for poverty reduction (FAO 2005a; Holmann et al. 2005). Its growth in recent years has been high especially in developing countries, where annual growth rates in the last 10 years in livestock have been 3.77% compared to 2.71% in crops and 1.18% in non-food commodities. In India, the contribution of livestock subsector to agricultural GDP has increased impressively, showing 33% in 2002 (FAO 2005b). The income share from livestock is usually higher among the poor livestock keepers. However, the strategies practised by most LDC governments towards intensive production are not usually pro-poor (Turner 2004). Poor livestock keepers face many problems that normally discourage them from investing further in this enterprise. It often plays a buffering role, but the poorer often fail to re-stock once sales have been made due to shocks and stresses, particularly bad natural shocks like successive droughts (Akter et al. 2008). In this situation, the poor sometimes may exit to even less remunerative alternative livelihoods. Depletion of stock and exit has longer-term implications in livestock production, vulnerability and poverty. Depletion would reduce buffering role and so poverty impact would even be deeper depending on the available new livelihoods.

Under the Livelihood Options Project (LOP) of the Overseas Development Institute and its partners, data on income and assets including livestock were collected in 2001/02, detailed information on livestock was collected for 2003/04, and detailed income of selected households from the same panel was collected in 2006/07. Two papers have been published (Akter et al. 2007; Deshingkar et al. 2008a) and another discussion paper is in process of publication (Akter et al. 2008) on the livestock component of this research. The focus of this study is to identify the livelihood activities that produce the major share of household income as well as to identify the livelihood pathways and strategies, and the role of livestock in these activities and strategies over a six year period. Key insights that are analysed in this study are:

- Identify pathways out of poverty (successful and less successful) and different livelihood activities/strategies
- Describe the pathways and challenges in these pathways
- Discuss the role of livestock in pathways out of poverty
- Identify how pro-poor initiatives to strengthen livestock in pathways out of poverty could be improved.

The paper proceeds as follows. Section 2 describes the methodology and data. Section 3 examines the extent of movements into and out of poverty amongst the sample households. Sections 4 and 5 describe the extent of destitution, vulnerability, viability and sustainability in

connection with livelihood pathways. Section 6 examines the factors associated with economic/poverty status. Section 7 summarizes the role of livestock in these livelihood connections. Finally, it draws some policy conclusions and recommendations and discusses the future direction of research.

2 Analytical framework and methods

The central concern of this paper is to explore pathways out of poverty and the role of livestock/livestock-based livelihood strategies in these pathways using a panel data set from the Indian State of Andhra Pradesh. An income-based definition of poverty is used because the given data set does not permit us to use consumption-based definitions or multi-dimensional approaches or to integrate qualitative and quantitative approaches of poverty measurement; poverty is generally multidimensional in nature (Osmani 2003; ADB 2004). It is often argued that income/consumption-based definition of poverty has the advantage of clearly dividing a population into mutually exclusive categories; however, consumption-based definition is usually considered more stable (Lipton and Ravallion 1995). Poverty profiles and poverty status regressions are conventionally used to answer who are poor. Dynamic processes that lead households to fall into and escape from poverty are analysed using poverty transitions (Baulch and McCulloch 1998).

In this paper, we will use poverty profiles and transition matrices in relation to pathways out of poverty giving emphasis to livestock-based pathways using income-based definition of poverty. Pathways can be distinguished into a number of categories such as agricultural, non-farm activity, multiple-activity, assistance and exit (Rivera and Qamar 2003). These pathways are complementary.[1] In this study we distinguish in-village, commuting, temporary migration and permanent migration sources of income. In each source, agriculture, livestock outside cultivation and non-farm sources are distinguished.[2] We identified extreme poor, vulnerable, viable and sustainable households based on a subjective range of income difference relative to poverty line of rural Andhra Pradesh.[3]

Conceptually, the extremely poor are likely to stay poor in the longer term, vulnerable households are likely to move ups and downs around the poverty line, viable households are likely to stay non-poor, sustainable households may never be vulnerable and non-poor. Those who have per capita income half or less than half the poverty line income are considered extreme poor because they are well below the poverty line. Those who are located above this level up to double the poverty line are considered vulnerable with higher possibility of alternating spell; those who have per capita income more than double up to triple the poverty line are termed viable and the remaining households who have income above the viable level are categorized into sustainable assuming they may never fall below the poverty line.[4] We presume that these categories would capture the

1. World Development Report 2008 distinguished between three complementary pathways such as farming, labour and migration. However, all types of pathways involve labour market, and even agricultural wage employment or unskilled non-farm work require transaction cost. Commercial agriculture, agribusiness, self-employment etc. could be considered different pathways. Pathways are often classified as commercial or market-oriented agriculture, part-time farming combined with off-farm rural jobs, exit (migration).
2. Contribution of animal traction in crop agriculture was not separated.
3. Poverty line is Indian Rupees (INR, in October 2008, USD 1 = INR 47.08) 3100.68 per person per annum for 2001/02, and INR 4028.65 per person per annum for 2006/07; these figures are based on the Andhra Pradesh rural poverty line of INR 292.95 per person per month for 2004/05 being deflated/inflated by GDP deflators to arrive at the values for the reference years. The official poverty line for 2004/05 was updated based on the 61st round of National Sample Survey Organisation (NSSO) conducted in 2004/05 using the Expert Group Method (GOI 2007). According to this method, the estimates of poverty are made by the Planning Commission from the large sample survey data on household consumer expenditure conducted by NSSO.
4. Households are often called vulnerable if they struggle to meet basic needs (sometimes deplete productive assets, sometimes depend on social protection); viable households are able to meet basic needs without extra support, sustainable households make some extra for stores, savings and investment (Sharp 2006). We assume that the specified band of income difference (relative gap from the poverty line for the poor and relative surplus from the poverty line for the non-poor) may represent these features. Although poverty line is defined based on income/expenditure necessary to meet basic needs, given that households are mobile in the dynamic frame, we consider a band based on value judgement. We examine the characteristics using our survey data.

economic mobility that is of longer-term consequences for some groups than is mobility indicated by broad poor/non-poor classification. At the next stage, we categorize them into unsuccessful, struggling, successful and more successful groups based on their economic mobility from 2001/02 to 2006/07 between extreme poverty, vulnerability, viability and sustainability. Unsuccessful are those who either moved from viable/sustainable to vulnerable or from vulnerable/viable to extreme or always remained in extreme poverty (27 households); struggling are those who are always vulnerable (53 households); successful are those who experienced upward mobility, either moving from extreme poverty to vulnerable/viable or from vulnerable to viable (48 households); and most successful are the top households in terms of economic status, who either moved from extreme/vulnerable/viable to sustainable or always remained viable/sustainable (27 households). This classification would even capture the kind of mobility that is of more long-term consequences because it is based on the poverty situation of a five-year period.

Data used are drawn from the LOP of the Overseas Development Institute of London conducted in six villages in Andhra Pradesh (AP). The survey incorporated multifarious interests related to livelihood diversities in several rounds since 2001/02; each round collected data using structured questionnaires of specific interest. In this study we track a panel of 155 households from 5 villages of Andhra Pradesh which comprises income data for both the 2001/02 round and the 2006/07 round, making it possible to compare poverty status. The LOP collected detailed information for 360 households stratified on land and caste (including the panel of 155 households) in 2001/02 on family composition and characteristics, access to assets and transfers, land use, crop production and livestock composition. Further detailed information on livestock composition, use and earnings, land use, migration pattern and earnings was collected during the 2003/04 round.[5] In addition to income, the 2006/07 survey collected detailed information on migration and included households having at least one commuter or migrant.[6] This panel includes 76 livestock holders in 2001/02 and 73 livestock holders in 2003/04 (93 households having livestock in any or both periods). Thus the panel consists of 49% of farms having one or more type of livestock compared to the 51% of the 360 farms having livestock. Data on livestock holding was not collected in 2006/07 and this is an important limitation for the present study. The panel consists of 39% landless as against the 41% in the sample of 360 households. The panel is identified from five villages, and three of them were well-connected while two were poorly-connected.[7]

The main advantage of the panel is that in addition to income data on six years gap, it contains a rich set of information in a greater detail from 2001/02 round, detailed changes in land use, migration and livestock holding from 2003/04 round and migration updates from 2003/04 and 2006/07 rounds. The disadvantage is that the basic characteristics such as household size and composition, education etc. were collected only once in 2001/02 and was not repeated in any of the re-surveys of the panel, while livestock holding was recorded in 2001/02 and 2003/04 but not in 2006/07. Re-surveys carried special interest and so did not record changes in all households.

5. A prolonged three-year drought continued until 2003/04. This survey was completed in early 2005. Livestock census in 2003 showed a marked decrease in indigenous cattle and cattle population, with a largely unchanged buffalo population (Deshingkar et al. 2007).
6. This survey was completed in April 2007.
7. The villages were defined poorly- or well-connected based on the infrastructure information of 2001/02. Village descriptions are available in Farrington et al. (2006); a summary (Box 1) in the appendix includes necessary descriptions.

3 Poverty profiles and transitions

This section investigates the extent of poverty transitions in the period 2001/02 to 2006/07. Poverty transitions are first presented in usual poor and non-poor classes for comparability with most other studies, and then these are presented in a four-class system to deepen our understanding of poverty dynamics. The transition matrix in Table 1 indicates that poverty reduced considerably in this 6-year period to 29% in 2006/07. About 45% were below the poverty line in 2001/02, with about 64% escaping absolute poverty and 23% of the non-poor falling into absolute poverty.[1] Overall, it appears that average mobility out of 100 households is 41.3. In other words more than 41% of the households move in or out of poverty in a 6-year period.[2] In this period the crude probability of becoming poor, given that you were non-poor, is 0.23 and the probability of escaping poverty, given that you were poor, is 0.64. Quintile based analysis show higher economic mobility. Diagonal entries over this period added up 29.7%; 36.2% moved upward and 34.1% downward (see Appendix 1). This is consistent with the quintile based transition matrices constructed from developing countries having immobility between 30–40% over a five-year period (Baulch and Hoddinott 2000).

Table 1. *Poor/non-poor transition matrix 2001/02–2006/07, Andhra Pradesh, India*

	Poor 2006/07	Non-poor 2006/07	Total
Poor 2001/02	25 (16.1)	44 (28.4)	69 (44.5)
Non-poor 2001/02	20 (12.9)	66 (42.6)	86 (55.5)
Total	45 (29.0)	110 (71.0)	155 (100.0)

Figures in brackets are percentages of total households.
Pearson Chi-Square = 3.129, DF = 1, Asymp. Sig. (2-sided) = 0.077
Data source: Livelihood options study surveys: Rounds 2001–02 and 2006–07.

Figure 1 makes the distribution more visible; 16% of the households were poor in both survey years, they could be termed chronically poor, 28% exit from and 13% fall into poverty and many of them may be transitory or vulnerable, about 43% were not poor in any of the two survey years. Examination of the poverty gap/squared poverty gap index reveals that the gap was higher in 2001/02. Poverty gap and squared poverty gap index were 19.8% and 11.5%, respectively, in 2001/02; and 9.8% and 4.9%, respectively, in 2006/07. Thus in absolute terms not only incidence of poverty was lower in the recent year but depth and severity (poverty gap index and squared

1. Poverty line (PL) is based on State-specific rural poverty lines in 2004/05, reported in per capita per month, and for AP it was INR 292.95 (GOI 2007). This figure is an estimate of the World Bank recommended calorie intake measure of poverty line (consumption expenditure required to meet a minimum per capita calorie requirement, 2400 Kcal per day in case of rural India) and is updated using large household sample survey on consumer expenditure for 2004/05. Based on this PL, incidence of poverty in AP was 11.2% in 2004/05. In this study the monthly PL was first converted into annual and then into 2001/02 and 2006/07 figures using annual GDP deflator. Thus the 2001/02 estimate is INR 3100.58 and the 2006/07 estimate is INR 4028.65 per capita per annum.
2. This does not count year to year transition in and out of poverty. Thus the transitory property is even stronger in the study villages than that found by the IFPRI study in rural Pakistan and ICRISAT study in India during the late 1990s (Baulch and McCulloch 1998; Baulch and Hoddinot 2000).

poverty gap index) were also lower.[3] This means that incidence, depth and severity of poverty are all falling in the study areas of Andhra Pradesh.

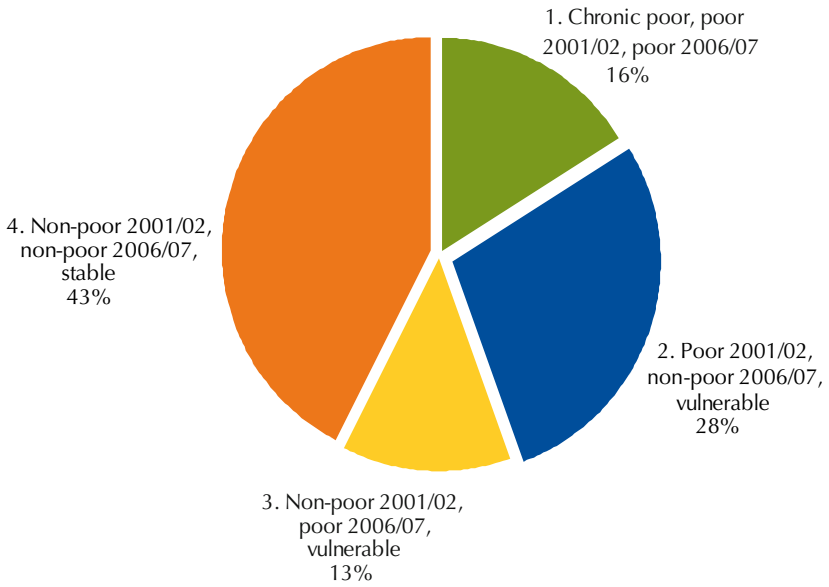

Figure 1. *Transition categories.*

The question follows: who are poor and where are they located? Overall poverty exists in well-connected and remote villages, among different caste categories, among landless, marginal and small farmers, and livestock holders but with different degrees of incidence. Poverty is proportionately higher among the schedule tribes (Table 2). It reduced considerably in 2006/07; still it is proportionally higher among the schedule tribes. Incidence among the backward castes is also slightly higher than average. Poverty is diagnosed more among the marginal farmers.[4] It is located proportionally more in poorly-connected villages.

Overall, prevalence of poverty was lower among the farmers having livestock in 2001/02. This trend reversed in 2006/07 for 2003/04 holders. Particularly incidence was much higher among the new holders in 2003/04. This may indicate that some poorer holders diversify livelihood through livestock to get rid of economic hardship. Some non-poor may have exit farming to avoid inefficiency in the face of drought. It may be possible that some holders of 2003/04 may become poor in 2006/07. In the data four new holders in 2003/04 were non-poor in 2001/02 and became poor in 2006/07 failing to cope with drought-related hazards. It may be possible that this enterprise was chosen without considering the likely threats of prolonged drought that was not possible

3. Head count ratio, poverty gap index (depth of poverty) and squared poverty gap index (severity of poverty) are three variants of FGT class of poverty measures defined by:

$$P\alpha = \frac{1}{N}\sum_{i=1}^{q}((z - yi)/z)$$

where N = total population
q = number of poor
z = poverty line
yi = income of household below poverty line
α = poverty sensitivity parameter.

When α = 0 it is headcount ratio, α = 1 is depth of poverty and α = 2 is severity index. Since P is additively decomposable with population share weights, poverty of any subgroup r is given by:

$$P\alpha_{\,r} = \frac{1}{Nrz^{\alpha}}\sum_{i=1}^{qr}((z - yi)/z))^{\alpha}$$

4. They are often categorized to small farmer, definition varies (Hazell et al. 2007). Usually, very small farm having land below 1 ha is considered marginal in India (Nagayets 2005). Here marginal farm category is taken as defined by National Sample Survey Organisation (NSSO) of India (GOI 2006).

to predict before buying livestock after 2001/02; it is not known whether they are still holding livestock because livestock data were not collected in the recent year. Without another livestock survey, it is not possible to draw a general conclusion, because 2003/04 data is drought-related. The results are most likely to be a temporary phenomenon. Akter et al. (2008) noted that long-term demand for livestock products in India is on an upward trajectory, and, in response, the keeping of livestock is likely to grow in the long term. An earlier analysis feared that the poorer might exit farming because such growth might result from technologies that only the better off could afford (Akter et al. 2007).

Table 2. *Percentage distribution of poor and non-poor by caste category, land holding group, location, and livestock farming, Andhra Pradesh, India*

Caste categories	2001/02			2006/07		
	Non-poor	Poor	Total	Non-poor	Poor	Total
Scheduled Tribe	37.5	62.5	100.0	50.0	50.0	100.0
Scheduled Caste	60.6	39.4	100.0	78.8	21.2	100.0
Backward Caste	53.1	46.9	100.0	67.9	32.1	100.0
General Category	60.6	39.4	100.0	75.8	24.2	100.0
Landholding group						
Landless	58.5	41.5	100.0	75.0	25.0	100.0
Marginal (>0 to 2.5 acres)	48.2	51.8	100.0	62.5	37.5	100.0
Other (>2.5 acres)	64.7	35.3	100.0	87.0	13.0	100.0
Village group						
Well-connected	62.1	37.9	100.0	76.8	23.2	100.0
Poorly-connected	45.0	55.0	100.0	61.7	38.3	100.0
Livestock farming						
Not holders 2001/02	43.0	57.0	100.0	67.1	32.9	100.0
Holders 2001/02	68.4	31.6	100.0	75.0	25.0	100.0
Not holders 2003/04	51.2	48.8	100.0	73.2	26.8	100.0
Holders 2003/04	60.3	39.7	100.0	68.5	31.5	100.0
Never holders	43.9	56.1	100.0	71.9	28.1	100.0
Always holders	68.6	31.4	100.0	74.5	25.5	100.0
Dropped in 2003/04	68.0	32.0	100.0	76.0	24.0	100.0
New holders in 2003/04	40.9	59.1	100.0	54.5	45.5	100.0
Total	55.5	44.5	100.0	71.0	29.0	100.0

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

To further extend the analysis of poverty situation and to deepen the understanding of poverty dynamics, we categorize the households into extreme poor, vulnerable, viable and sustainable categories based on the proportionate difference of income from the poverty line. Extreme poverty appears declining considerably in the reference period and at the same time viability is rising. However, sustainability and vulnerability exhibit a slightly declining trend (Table 3). Most of the extreme poor may also be destitute households.[5] We would expect sustainable households never fall into poverty. It is of interest to identify who are in the same category and who are mobile. The transition matrix in Table 4 shows that movement between groups is substantial in this period of six years. Only 3 households out of 25 remain in the same category of extreme poor.[6] This is in

5. Devereux (2003) defined destitution as a state of extreme poverty that results from the pursuit of unsustainable livelihoods, meaning that a series of livelihood shocks and/or negative trends or processes erode the asset base of already poor and vulnerable households until they are no longer able to meet their minimum subsistence needs, they lack access to the key productive assets needed to escape from poverty, and they become dependent on public and/or private transfers. Having income gap less than minus 0.5 means that the per capita income is less than half the poverty line income and these households are unlikely to meet minimum subsistence.
6. Therefore extreme poverty cannot be equated with 'destitution'.

line with ICRISAT panel research supporting transitory nature of poverty (Baulch and Hoddinot 2000). Whilst 11 new households from other categories moved into extreme poverty, 22 extreme poor moved to other categories. Thus the probability to being extremely poor is reducing; the crude probability of being extremely poor in 2001/02 was 16% that reduced to 9% in 2006/07. Movement between quintile groups is also substantial in these six years (Appendix 1).

Table 3. *Frequency and percentage distribution by poverty categories, 2001/02–2006/07, Andhra Pradesh, India*

Household categories[a]	2001/02		2006/07	
	N	%	N	%
Extremely poor (≤ 0.5*PL)	25	16.1	14	9.0
Vulnerable (> 0.5 and ≤ 2)*PL	85	54.8	82	52.9
Viable (> 2 and ≤ 3)*PL	24	15.5	43	27.7
Sustainable (> 3*PL)	21	13.5	16	10.3
Total	155	100.0	155	100.0

a. PL means poverty line income. Extremely poor households have half the PL or less, vulnerable have more than half to double the PL, viable have greater than double to triple the PL and sustainable have more than triple the PL.
Data source: Livelihood options study surveys: Rounds 2001–02 and 2006–07.

Table 4. *Transition matrix based on subjective vulnerability categories, 2001/02–2006/07, Andhra Pradesh, India*

No. of households in 2001/02	No. of households in 2006/07				Total
	Extremely poor	Vulnerable	Viable	Sustainable	
Extremely poor	3 (1.9)	16 (10.3)	5 (3.2)	1 (0.6)	25 (16.1)
Vulnerable	7 (4.5)	53 (34.2)	20 (12.9)	5 (3.2)	85 (54.8)
Viable	4 (2.6)	6 (3.9)	11 (7.1)	3 (1.9)	24 (15.5)
Sustainable	0 (0.0)	7 (4.5)	7 (4.5)	7 (4.5)	21 (13.5)
Total	14 (9.0)	82 (52.9)	43 (27.7)	16 (10.3)	155 (100)

Figures in brackets are percentages of total households.
Data source: Livelihood options study surveys: Rounds 2001–02 and 2006–07.

In general, moving to and from next category is more common (Table 4). This is plausible; it is not usual to get access to as much resources as necessary to move from extreme poverty to viable/ sustainable categories, though it may be common to have some resources to reach the next vulnerable stage. The probability of being sustainable is one-third given that their per capita income was three times or more than the poverty line income five years ago. There are extreme cases such as when a household was extremely poor in 2001/02 but achieved a greater success by reaching the top category. This household realized it by combining farm business with non-farm activities through commuting. Two extremely poor households also reached the sustainable stage through the seasonal migration route; one of them also had a cow and goat in 2001/02 but had stopped livestock farming in 2003/04 as the training he had received in driving a light vehicle provided him with a better means of earning. These households are located in a well-connected village in the Medak district; given its location near to urban areas, non-farm livelihood options and skill training are more accessible to it. Five cases became viable from extreme poor; four of them diversified livelihoods with farming as well as livestock-related and non-farm activities.[7] All of them diversified with non-farm activities through migration route. On the other hand, four cases appeared most unsuccessful by reaching the extreme poverty from the viable category. They failed through the same farm plus non-farm migration route (two of them also had livestock-related activities). All of them are unskilled and in addition they had to experience at least one type of shock. For

7. Farm and non-farm are extremely restricted categories consisting of very different industries. More mobility could be found with further disaggregation of farm and non-farm activities.

example, one of them had to borrow to meet medical need. In the study locations, about 37% of the households which experienced decrease in livestock during 2001/02 to 2003/04 had to sell livestock due to domestic shock or stress, another 22% experienced decrease due to pest/disease problem, 75 farm households (out of 211 livestock farms, i.e. about 36%) sold to meet major expenses, 68 (91% of who sold) of them failed to restock (Akter et al. 2007, 2008).

Although extreme poverty was reduced considerably in 2006/07, vulnerability did not reduce much. More than half the households (62%) remain either extremely poor or vulnerable or move between these two categories in the two periods (2001/02 and 2006/07). This result has considerable implications for combating poverty. Particularly, many vulnerable households remain vulnerable and they could be victims of any kind of idiosyncratic shocks. Any poverty reduction strategy should target this group along with the extremely poor.

4 Who are destitute/vulnerable/viable/sustainable?

In the previous section, we used an income-based poverty line to identify different categories of poor households. However, poverty is multi-dimensional. From our data we would like to cross-check whether the extremely poor are destitute and whether vulnerability, viability and sustainability are closely linked to their conceptual meaning with respect to access to resources.[1] Only 3 out of 155 households were extremely poor in both periods (out of 25 extremely poor in 2001/02 and 14 in 2006/07), others were mobile. Extremely poor in both periods may be termed chronic poor and they could be confirmed destitute.[2] From Table 5 it appears that they did not own any livestock assets (all extremely poor households with livestock improved their income situation). From the data, we found that they were either landless or marginal (one of them sold land between 2001/02 and 2003/04) and they did not acquire any livestock in 2003/04. Poverty is higher among the marginal land holders than the landless. Some vulnerable households could fall into extreme poverty; the maximum crude probability of this is 8% of the vulnerable households in 2001/02. The probability of the vulnerable to remain vulnerable is high (more than 62% of the vulnerable households). The majority of landless households were vulnerable (63% in 2001/02, 57% in 2006/07). About 75% of the landless were either poor or vulnerable in 2001/02. Destitution is low, extreme poverty is reducing, vulnerability remains nearly the same, and viability is rising. Although extreme poverty is reducing, the proportion of the landless in this group is rising. In 2001/02, a quarter of extremely poor households were landless, whilst in 2006/07, half of extreme poor was landless; the number of landless who exited were equal to the number falling into poverty, keeping the absolute number of extremely poor landless unchanged. Those who moved upward did so mainly through diversification of economic activities within villages and through migration route; only one of them became a specialized livestock farm.

It emerges from Table 5 that modern technology such as irrigation and electric motors could be a route to success. With access to these technologies 10 extremely poor moved to higher status, 2 of them became viable and sustainable. Livestock could bring success if risks arising from idiosyncratic shocks and diseases could be minimized through appropriate policy measures. For example, targeted social protection such as small, regular stipends could help to meet cash needs in the face of, e.g. health shocks, and so may prevent livestock holders from selling their stock. Several households became successful through chit funds which are group saving schemes, popular in South India (Klonner 2002). Vulnerable households which had bank accounts saved regularly to invest and to move to the higher position. Previous savings of any type help to cope with crises arising from drought. Social protection transfers were accessible to most of the extreme poor and vulnerable households. The most common type of such transfers was public food distribution through white card followed by education scholarship.

It is apparent from Table 5 that the categories based on income difference represent broadly to the conceptual meaning. However, there are exceptions. For example, some extremely poor had access to irrigation/electric motor and moved to the higher position in the next period and so they should not be destitute in the conceptual sense. On the other hand, some of them failed to move upward or even fall into poverty with such access and social protection.

1. As described in footnotes 2 and 3, on page 3
2. However, as this applied only to 3 out of 25 extremely poor households, ‘destitute’ would not be synonymous with ‘extremely poor’. Not all extremely poor are destitute.

Table 5. *Access to resources by different types of poor/non-poor*

Question	Clarification from data		Remarks
	2001/02	2006/07	
Did extremely poor own land?	5 out of 25 were landless in 2001/02, 14 were marginal, 6 were small	5 out of 14 were landless in 2001/02, 8 were marginal; 3 were extremely poor in both periods: 1 landless and 2 marginal	Majority of the extremely poor came from marginal land category
Did extremely poor had productive assets?	10 out of 25 had access to irrigation in 2001/02, 6 of them also had access to electric motors	3 had access to canal irrigation and 1 access to electric motor in 2001/02, fall into extreme poverty in 2006/07	All 10 extreme poor in 2001/02 with access to irrigation/electric motors moved to higher groups; 2 became viable and 1 sustainable
Did extremely poor had livestock assets?	11 out of 25 had livestock in 2001/02, 4 of them became viable in 2006/07 and 6 became vulnerable in 2006/07	5 out of 14 had livestock in 2001/02, had to sell due to domestic shock or disease problem in 2003/04, thus failed to do well with livestock	2 became viable and had milch animals, the 3 extremely poor in both periods had no livestock
Was extreme poverty dependent on public transfer?	21 out of 25 received one or more social protection transfers	All 14 received at least one benefit	Social protection transfers appear accessible to most extremely poor
Vulnerable: Were they depleting assets?	70 households out of 85 intended to sell at least one type of productive assets in 2001/02 in case of risks	59 households out of 82 intended to sell at least one type of productive assets in case of risks	Most of the vulnerable intended to sell productive assets in case of risks
Vulnerable: Were they receiving supports?	82 received at least one type of benefit	74 received at least one type of benefit	Social protection is accessible to vulnerable
Vulnerable: Were they saving/ investing?	52 pursued at least one type of saving; 18 became viable/ sustainable in 2006/07	47 pursued at least one type of saving in 2001/02, 4 out of 8 became viable/ sustainable with regular family savings	Regular savings are important to climb poverty ladder
Viable: Were they saving/ investing?	17 out of 24 had at least one type of savings, 4 of them had bank account, one sold asset	32 out of 43 had savings, 7 had bank accounts, 2 sold asset	Most of the viable households were saving without bank account
Sustainable: Were they saving/investing?	16 out of 21 had savings, 11 had bank accounts, none sold asset	All but 1 out of 16 had savings, 6 had bank accounts, none sold asset	Greater proportion of sustainable households save in bank

Data source: Livelihood options study surveys: Rounds 2001–02 and 2006–07.

There are cases of success and less success in other groups as well. To consider this transition and to explain who exited from, who fell into poverty and by which pathway, we divide the 155 households into 4 categories:

- unsuccessful are those who either moved from viable/sustainable to vulnerable or from vulnerable/viable to extremely poor or always remained in extreme poverty (27 households)
- struggling are those who always remained vulnerable (53 households)
- successful are those who either moved from extreme poverty to vulnerable/viable or from vulnerable to viable (48 households), and

- most successful are the households who either moved from extremely poor/vulnerable/viable to sustainable or always remained viable/sustainable (27 households).

Average per capita income of the unsuccessful group was relatively higher at the beginning of the panel and as per our definition it became the lowest income group at the end of the panel survey (Table 6). On the other hand, the most successful group always remains the highest income category, in terms of both average and median. Those who are struggling bear the lowest average income at the start of the panel survey (when the median income was the lowest for the successful group), but reached the second lowest income group position at the last year of the panel survey, both in terms of average and median.

Table 6. *Per capita income in 2006/07 Indian Rupees, Andhra Pradesh, India*

Group	N	2001/02			2006/07		
		Mean	SE of mean	Median	Mean	SE of mean	Median
Unsuccessful	27	10,604	1678	9820	3986	841	2938
Struggling	53	3870	211	3735	4330	290	4000
Successful	48	5440	1385	2466	9049	1763	7389
Most successful	27	16,086	4143	11,461	20,325	4169	16,250
Total	155	7652	957	4097	8544	1034	5233

Data source: Livelihood options study surveys: Rounds 2001–02 and 2006–07.

The question follows who belongs to these economic mobility groups. Three unsuccessful cases that were chronically poor belong to lower caste. Although scheduled tribes (ST) are proportionately poorer, scheduled castes (SCs) are relatively struggling more and this group is more dominant than SCs in the Andhra Pradesh caste hierarchy; more than 21% of the sample households were SCs whilst 5% were STs. SCs are least represented in the most successful group. Both groups are the least upwardly mobile categories.

Although the incidence of poverty at a particular point of time appeared higher among the marginal farms in the previous analysis, the investigation in this section on poverty dynamics shows that landless and marginal land holders are equally struggling implying that the risk of falling into poverty is almost equal for both groups (Table 7). Landless are less likely to become sustainable, and the chances of the marginal farms to become sustainable are much higher than the landless. Higher land holders are likely to move upward. Statistically the difference between these three land holding groups was highly significant at the 1% level as shown by the χ^2 or likelihood ratio test.[3] On the face of it, land assets should not be that important for households with migration/commuting and non-farm income as poverty-reducing strategies. However, economic advancement occurs most rapidly where it builds on existing assets, whether economic, physical or social. Some advancement represents a specialization where farmers acquire more land and specialize in agriculture, or where traders develop their market links. In other cases, existing assets constitute a springboard for diversification, for instance, keeping rainfed farming 'ticking over' during the wet season whilst searching (locally or further afield) for new work in the dry season. If there is more than one working member in the family, both farm and non-farm activities are simultaneously possible and often complementary to raise income. From extensive household surveys in AP and MP (Farrrington et al. 2006), it is clear that households in the poorest quintile, who have only limited land, also have few other assets, including limited social and political contacts, and so are

3. χ^2 = 18.03 with 6 df, C; likelihood ratio = 18.93 with 6 df, χ^2 or likelihood ratio test.

either unable to diversify at all, or do so only in a 'scavenging' mode, picking up whatever short-term work comes their way, with little prospect of economic advancement. As a matter of fact the majority of those who belong to the category of landless often belong to historically disadvantaged groups. They continue to be socially and economically excluded and are unable to access opportunities that higher castes are able to (because of their connections, social standing and political clout). Migration and commuting do offer landless labourers a chance to move away from traditional, land-based agrarian relations. Earnings from migration can help the poor to smooth consumption, repay debts and invest in assets (Deshingkar et al. 2008b), though better deals are usually inaccessible to them making it difficult to move out of vulnerable situations.

Table 7. *Percentage distribution of poor and non-poor by caste category, land holding group, location, and livestock farming, Andhra Pradesh, India*

	N	Unsuccessful	Struggling	Successful	Most successful	Total
Caste categories						
Scheduled Tribe	8	25.0	37.5	12.5	25.0	100.0
Scheduled Caste	33	18.2	45.5	24.2	12.1	100.0
Backward Caste	81	17.3	34.6	32.1	16.0	100.0
General Caste Category (OCs)	33	15.2	21.2	39.4	24.2	100.0
Landholding group						
Landless	60	23.3	38.3	30.0	8.3	100.0
Marginal (>0 to 2.5 acres)	72	15.3	38.9	27.8	18.1	100.0
Other (>2.5 acres)	23	8.7	8.7	43.5	39.1	100.0
Village setting						
Well-connected	95	21.1	33.7	26.3	18.9	100.0
Poorly-connected	60	11.7	35.0	38.3	15.0	100.0
Livestock farming*						
Not holders 2001/02	71	20.3	34.2	38.0	7.6	100.0
Holders 2001/02	84	14.5	34.2	23.7	27.6	100.0
Not holders 2003/04	82	11.0	39.0	34.1	15.9	100.0
Holders 2003/04	73	24.7	28.8	27.4	19.2	100.0
Total	155	17.4	34.2	31.0	17.4	100.0

*Stock information was collected in 2001/02 and in 2003/04. Entry/exit time was not recorded, can happen any time in between.
Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

Regarding the village groups, we found earlier that well-connected villages hold proportionally more non-poor but poverty dynamics shows that downward mobility was higher in these villages; 21.1% were unsuccessful compared to 11.7% in poorly-connected villages. This indicates that infrastructure development to improve village connection could reduce poverty because better village connection widens the opportunity to diversify non-farm activities along with agriculture and livestock. However, in the longer term the challenge of reducing the risk of downward mobility remains.

Livestock holding makes significant difference in economic mobility, according to Chi-square tests. Proportionately more non-holders than holders in 2001/02 are unsuccessful, but at the same time the pattern is opposite for 2003/04 holders; the share of 'unsuccessful' households within the 'holders 2003/04' is twice as high as within the 'non-holders 2003/04' group. In the most successful category, there are proportionately more holders than non-holders. In the combined share of successful and most successful, the difference between holders and non-holders is very

little. Interestingly, households which had exited livestock keeping in 2003/04 became relatively more successful than other groups in 2006/07 (Appendix 2). The 2003/04 livestock survey was done at the end of a three-year prolonged drought. Thus the farms which exited moved to more rewarding livelihood through migration/commuting route mostly in addition to cultivation enabling them to be more successful. New holders were the most unsuccessful; it is not actually known exactly when they have started farming. The descriptive analysis of livestock holding in Table 8 shows that unsuccessful households kept the largest herds, on average in both periods (this group includes a poultry farm having maximum number of birds, this farm was identified new in 2003/04 survey). Those who are struggling on average have the smallest herds. It therefore appears difficult to deduct the contribution of livestock to fighting poverty from this data alone.

Table 8. *Total livestock holdings in SLUs by household group, Andhra Pradesh*

Group	2001/02			2003/04		
	Mean	SE of mean	Median	Mean	SE of mean	Median
Unsuccessful	2.70	0.84	1.26	2.28	0.78	1.20
Struggling	0.91	0.18	0.00	0.72	0.19	0.00
Successful	1.78	0.81	0.00	0.86	0.25	0.00
Most successful	2.27	0.54	1.40	1.19	0.31	0.40
Total	1.73	0.31	0.20	1.12	0.18	0.00

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

5 Pathways out of poverty

This section deals with the question about what the pathways out of poverty are. Exit paths are not as straight forward as one may tend to think. They are not only the 'agriculture ladder' or the 'livestock ladder' or the 'migration route' but mostly a combination or diversification of these strategies. The investigation of income shares shows that the unsuccessful group derived more than 80% of its income share from in-village agriculture in 2001/02 but this was reduced to about 52% in 2006/07 (Table 9). On the other hand, this group doubled its share of rural non-farm income and raised its income share from geographical mobility considerably. Yet these households still failed to exit or avoid extreme poverty.

Table 9. *Share of income by activities and household economic status, Andhra Pradesh, India*

	Unsuccessful		Struggling		Successful		Most successful		Total	
	2001/02	2006/07	2001/02	2006/07	2001/02	2006/07	2001/02	2006/07	2001/02	2006/07
In-village										
Agriculture	82.7	51.7	29.0	29.4	50.2	35.3	34.3	31.7	58.3	33.9
Livestock outside cultivation	3.0	0.9	7.9	5.1	1.5	1.2	22.5	4.0	7.9	3.0
Non-farm	6.1	13.1	20.3	10.7	13.8	5.9	16.0	13.5	11.7	10.1
Commuting*										
Agriculture	0.0	3.9	0.0	8.7	1.8	10.0	0.0	0.8	0.0	5.4
Livestock related job	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1
Non-farm	1.2	16.1	3.5	19.9	11.0	18.6	4.1	22.4	4.1	20.7
Seasonal migration**										
Agriculture	1.1	1.7	13.7	3.8	6.5	3.9	2.5	0.0	4.0	2.2
Livestock related job	0.0	0.1	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.7
Non-farm	1.2	3.8	2.5	14.8	1.2	18.4	6.5	19.7	2.6	17.2
Remittance										
Agriculture	0.2	0.0	2.8	0.3	1.5	0.0	0.0	0.0	0.0	0.1
Livestock related job	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Non-farm	4.5	5.0	20.3	3.1	12.7	6.7	14.0	7.9	10.3	6.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Commuting was not explicitly recorded for all activities other than regular salaried jobs in government and private sectors in 2001/02 survey. Moreover, these made a change in the definition of commuting in 2006/07 that involved short trips up to a week, or more than a week is migration, whilst in 2001/02 commuting meant daily trips.
** Migrants carry draught livestock to do certain types of activities like sugarcane cutting, for such activities livestock income was not separated.
Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

Note that the share of income from livestock outside cultivation was about 23% in 2001/02 for the top successful group but the share declined to only 4% in 2006/07. This effect is clearly drought related as mentioned earlier. Akter et al. (2008) identified drought as a major reason for the decrease in livestock farming (Appendix 3) and bovines were sold predominantly by better off households. They successfully invested the cash from selling livestock into alternative farm and non-farm opportunities. At the same time, a few new farms with commercial poultry or milch animals were being introduced by the better off households indicating changes in technology in favour of them. In the study area, during 2001/02 to 2003/04 period, livestock farming fell at an annual rate of 2.7% but at the same time standard livestock units fell only by 0.7 units in 4 years (from 2.9 units in 2001/02 to 2.7 units in 2003/04).[1] In the present sample, annual reduction

1. Conversion factors used to calculate Standard Livestock Unit are: bull = buffalo = 1, cow = 0.7, goat = sheep = 0.1, pig = 0.4, poultry = duck = 0.02.

in farming is 3.4%.[2] Units of livestock did not fall much due to increase in commercial poultry production that was afforded by relatively better off households.

Access to non-farm activities through commuting and seasonal migration was enhanced tremendously during these six years. Farm activities through seasonal migration declined but were enhanced through commuting. However the difference in case of commuting should be interpreted with caution because commuting was not explicitly recorded for all activities other than regular salaried jobs in government and private sectors in 2001/02 survey. Moreover, in 2006/07 a modified definition of commuting was used so that it involved short trips up to a week; more than a week was considered migration; whilst in 2001/02 and 2003/04 commuting meant daily trips. Having said this, in a nutshell, migration and commuting for non-farm activities emerge dominant strategies of livelihood diversification. However, there is little difference between poverty mobility groups in regard to income shares derived from migration and commuting, especially in 2006/07.

Livestock income share is low although it is a common enterprise along with other farm and non-farm industries. About 59% of the panel households had one or more types of livestock in 2001/02 and about 50% were livestock keepers in 2003/04 (Table 10). More than 60% were holders of livestock either in 2001/02 or 2003/04. In addition, some other households also earned income through livestock related activities or jobs such as grazing, milk collection/ delivery etc. Thus around 50% of the households in 2006/07 held one or another type of livestock or earned income from livestock related occupations, either in-village or outside the village through migration or commuting. Table 9 indicates that livestock related jobs are increasing through migration/commuting route and holders get both direct and indirect benefits either from livestock products or through the labour market, but cannot indicate diversification strategies. Table 10 indicates the importance of diversification strategies. Only 17.4% of the farms in 2001/02 and 21.8% in 2006/07 practised a single strategy, within which there is also diversification. So the success depends on the ability to combine the opportunities in different sectors. Livestock is an important component in the diversification strategy.

Table 10. *Percentage distribution of households by economic status and livelihood source, Andhra Pradesh, India*

Livelihood source	Unsuccessful	Struggling	Successful	Most successful	Total	Unsuccessful	Struggling	Successful	Most successful	Total
	2001/02					2006/07*				
Agriculture alone	7.4	11.3	16.7	7.4	11.6	7.4	9.4	8.3	3.7	7.7
Livestock alone	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.6
Non-farm alone	3.7	9.4	6.3	0.0	5.8	3.7	15.1	14.6	18.5	13.5
Agriculture plus livestock	22.2	13.2	8.3	11.1	12.9	11.1	5.7	8.3	7.4	7.7
Farm plus non-farm	25.9	22.6	31.3	11.1	23.9	22.2	32.1	31.3	25.9	29.0
Farm plus livestock plus non-farm	29.6	41.5	29.2	70.4	40.6	33.3	32.1	35.4	29.6	32.9
Livestock plus non-farm	11.1	1.9	8.3	0.0	5.2	22.2	3.8	2.1	14.8	8.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Livestock owners were not identified in 2006/07 data, 2003/04 ownership was used in this case.
Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

2. Calculated from data in Table 2, numbers of livestock farmers were 84 in 2001/02 and reduced to 73 in 2003. Assuming r = average annual growth, Y0 is initial value, Yt is the final value, t is the time period (4 years in this case), then $r = (Yt/Y0)^{(1/t)} - 1$.

The transition matrix showing mobility of the seven livelihoods between 2001/02 to 2006/07 reveals that the majority of the households changed their livelihood path (Table 11). All diagonal entries are less than 50%. The two groups with the highest proportion of households maintaining the same path were the most diversified groups (farming, livestock plus non-agricultural livelihoods and farm plus non-farm activities); the crude probability for both groups is almost equal at 46%).[3] Only 17% of the agricultural farms remained in the same occupation until the last year of the panel; 11% moved to other occupations, either livestock or non-farm; the remaining 72% diversified either through non-farm, or livestock or both; the highest proportion did it by including non-farm activities (50%).

Table 11. *Transition matrix showing mobility between livelihoods, 2001/02 to 2006/07, Andhra Pradesh, India*

		2006/07							
		Agriculture alone	Livestock alone	Non-farm alone	1 plus 2	1 plus 3	1 plus 2 plus 3	2 plus 3	Total
		1	2	3	4	5	6	7	
2001/02	1	16.7	5.6	5.6	5.6	50.0	16.7	0.0	100.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	0.0	0.0	41.7	0.0	25.0	25.0	8.3	100.0
	4	5.0	0.0	5.0	25.0	15.0	40.0	10.0	100.0
	5	8.1	0.0	24.3	5.4	45.9	16.2	0.0	100.0
	6	7.9	0.0	19.0	4.8	19.0	46.0	3.2	100.0
	7	0.0	0.0	20.0	20.0	20.0	40.0	0.0	100.0
Total		7.7	0.6	18.7	7.7	29.0	32.9	3.2	100.0

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

To examine if the most promising exit path is the farming route or the farm plus livestock route or the non-farm route, we identified four different routes:

- route 1 may be termed farm/livestock route where the households either always remained in farm/livestock or moved to farm/livestock in 2006/07 from another livelihood,
- route 2 may be termed non-farm route where the households either remained in non-farm activities or moved from farm/livestock in 2001/02 to non-farm in 2006/07,
- route 3 is the most diversified,[4] either with income from all three sources or households became earners from all three sources in 2006/07 and finally,
- route 4 is also diversified but less than route 3.

We compare the exit paths firstly by poor/non-poor classification as it is more common and straight forward to estimate long-run poverty headcount using the Markov Model of poverty transitions

3. In 2006/07, all households in this pane are using migration route to diversify economic activities. Even at the beginning of 2001/02, more than 40% of the migrating households were diversifying these three types of activities (Appendix 2).
4. There are other ways to define routes. We have chosen this grouping based on the mobility of households between seven types of broad activities as in Tables 10 and 11. One can even diversify within each type of these broad activities and remaining in the same activity group does not mean specialization or commercialization in the true conceptual sense.

(Baulch and McCulloch 1998).[5] This is done in Table 12. Then exit paths are examined by the classification of economic status as defined earlier such as 'unsuccessful, struggling, successful and most successful'. In Table 12 entry and exit probabilities are defined as the percentage mobility in economic status between 2001/02 and 2006/07, given that the households were non-poor and poor, respectively. Thus the probability of the four categories 'remained poor', 'escaped poverty', 'remained non-poor' and 'became poor' are calculated as follows and then multiply with 100 to obtain it in percentage terms:

- Remained poor is the ratio of poor 2006/07 to the poor 2001/02
- Escaped poverty is the ratio of non-poor 2006/07 to the poor 2001/02
- Remained non-poor is the ratio of non-poor 2006/07 to the non-poor 2001/02
- Became poor is the ratio of poor 2006/07 to non-poor 2001/02.

Table 12. *Entry–exit probabilities in percentage by different routes, 2001/02 to 2006/07, Andhra Pradesh, India*

Poverty status	Always remains/ move to farm/ farm + livestock	Always remains/ move to non-farm	Always remains/ move to farm + livestock + non-farm	Always remains/ move to farm + non-farm/livestock + non-farm
	Route 1	Route 2	Route 3	Route 4
Remained poor (Poor → poor)	25.0	33.3	44.0	33.3
Escaped poverty (Poor→ non-poor)	75.0	66.7	56.0	66.7
Remained non-poor (Non-poor → non-poor)	88.2	75.0	76.9	71.0
Became poor (Non-poor → poor)	11.8	25.0	23.1	29.0
Headcount 2001/02	32.0	42.9	49.0	46.6
Headcount 2006/07	16.0	28.6	33.3	31.0
Equilibrium (long-run) headcount	13.6	27.3	29.2	30.3
Sample size (N)	25	21	51	58

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

For example, the value 25.0 in the first cell of the 'route 1 column' of Table 12 is the ratio of poor in 2006/07 to poor in 2001/02 and it means that 25% of the poor in 2001/02 are also poor in 2006/07. In this analysis the route 1 which is the 'farm with livestock route' appears the best in terms of escaping poverty and falling into poverty and long-run headcount is 14% through this path. However, based on the four-group classification, route 2 which is the non-farm route appears the best because the risk of being unsuccessful is the lowest through this route (Table 13). Through 'route 2' the unsuccessful proportion is much less than other paths but still a slightly higher proportion is struggling and from the previous table we noted that about 67% of the poor escaped poverty through route 2. This means that those who escaped through the available non-farm route are still close to the poverty line.

5. According to the Markov Model of Poverty Transitions the equilibrium headcount is defined as the equality between the number of households' exits poverty and the number of households enters into poverty. Symbolically, H*.hpn = (1-H*.hnp), or, H* = 1/[(hpn/hnp)+1], where, H* is equilibrium headcount, hpn is proportion of poor households which exit poverty and hnp is the proportion of non-poor households which enter into poverty.

Table 13. *Probabilities of becoming success in percentage by different routes, 2001/02 to 2006/07, Andhra Pradesh, India*

Group	Always remains/ move to farm/farm + livestock	Always remains/ move to non-farm	Always remains/move to farm + livestock + non-farm	Always remains/move to farm + non-farm/ livestock + non-farm
	Route 1	Route 2	Route 3	Route 4
Unsuccessful	20.0	4.8	17.6	20.7
Struggling	36.0	38.1	33.3	32.8
Successful	32.0	33.3	33.3	27.6
Most successful	12.0	23.8	15.7	19.0
Total	100.0	100.0	100.0	100.0
Sample size (N)	25	21	51	58

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

6 Factors associated with economic status

This section examines the correlates of unsuccessful, struggling, successful and most successful status. To do this, a multinomial logit model was estimated using household characteristics, access to land, assets, physical capital, livestock etc. for the year 2001/02. We also included some other variables that indicated livelihood pathways to measure their likely impact on the economic status. The results are presented in Table 14 (description of the variables is included in Appendix 5). About 50% of the 21 variables are significant correlates of at least one type of economic status (significant at 10% or less). In the multinomial logistic analysis, the coefficient of the model is the log of the ratio of the probability of choosing one category over the probability of choosing the reference category and anti-log of the ratio, and is called the odds ratio. For example, the odds attached to land ownership for the 'struggling' group is 0.488 (which is significant at about 2%) meaning that the probability of falling in the 'struggling' position is almost half the probability of being in the 'most successful' category (the reference group) for a household which owns one acre more of land than average land ownership in the sample. The negative sign of the coefficient means that the probability of being in this category is less than the reference category. Most of the results appear in keeping with intuition and what is happening in the study villages according to qualitative and quantitative evidence. An increase in owned land decreases the probability of becoming unsuccessful or struggling relative to most successful households. In particular this correlate is highly significant for those who are struggling as interpreted above. A similar relationship is obtained for the variables schooling, livestock asset 2001/02, primary and secondary education of head, migration route and agriculture–livestock route. Household head having completed primary or secondary education reduces the probability of becoming unsuccessful/struggling/less successful than most successful households and the size of the effect is higher for those having secondary education. Landlessness and family size have positive effects. Landlessness is not a statistically significant correlate at 10%. Households having more family members are likely to be more unsuccessful/struggling and less successful. Performance of agricultural asset variable is not consistent; the reasons however are not clear. When we examined the data, we noted that some households became successful with electric motors but others failed with the same strategy; however the data did not clarify the reasons why this was the case (noted in discussions related to Table 5).

The effect of livestock asset in 2003/04 appears opposite to that in 2001/02. This result may correspond partly to the drought related arguments being put earlier in this study. Average livestock holding was the highest for the most successful group in 2001/02 but the holding in 2006/07 was the highest for the unsuccessful group with much higher standard deviation (Appendix 5). Higher standard deviation was due mainly to three large livestock farms in this group; one of them was a 'large ruminant' farm which had a larger holding in 2001/02 facing pest/disease problem to reduce the size in 2003/04. The other two were commercial poultry farms, one of them had bird size of 400 (this was a new farm in 2003/04 and was landless in 2001/02), and the other was relatively larger in size having 1000 birds (this farm increased its size from 700 birds in 2001/02 to 2000 in 2003/04). Both farms had loans from moneylender in 2001/02. It is not known from the data why they were unsuccessful in 2006/07 with poultry, because livestock survey was not carried out after 2003/04.

Table 14. *Multinomial logistic regression on household economic status, Andhra Pradesh, India*

Variables[a]	Unsuccessful			Struggling			Successful		
	B	Sig.	Odds	B	Sig.	Odds	B	Sig.	Odds
Intercept	–0.071	0.976		–0.386	0.862		–0.094	0.965	
Land owned	–0.474	0.160	0.622	–0.717	0.015	0.488	0.041	0.291	1.042
Schooling	–0.012	0.754	0.988	–0.037	0.262	0.964	–0.030	0.348	0.970
Landless	1.443	0.171	4.233	0.674	0.486	1.961	1.421	0.113	4.143
Agricultural asset (log)	0.043	0.696	1.044	–0.005	0.960	0.995	0.026	0.764	1.027
SLU 2001/02	–0.443	0.152	0.642	–0.117	0.665	0.890	–0.549	0.038	0.578
Primary h	–2.539	0.013	0.079	–2.014	0.024	0.133	–2.127	0.014	0.119
Secondary h	–4.028	0.005	0.018	–3.335	0.007	0.036	–3.908	0.002	0.020
Age head	–0.006	0.849	0.994	–0.001	0.964	0.999	–0.007	0.814	0.993
Family size	0.075	0.778	1.078	0.489	0.027	1.630	0.368	0.074	1.444
Female h	0.699	0.651	2.011	0.338	0.816	1.402	–1.354	0.419	0.258
Benefit index	0.021	0.972	1.021	–0.826	0.118	0.438	–1.023	0.051	0.360
Age W 2006	0.077	0.113	1.080	0.051	0.270	1.052	0.056	0.224	1.057
SLU 2003/04	0.767	0.029	2.153	0.131	0.694	1.140	0.176	0.584	1.192
mig0104	–1.966	0.023	0.140	–1.331	0.096	0.264	–0.663	0.402	0.515
com0406	0.467	0.580	1.595	1.537	0.048	4.651	0.781	0.291	2.184
agliv2or6	–2.857	0.092	0.057	–2.709	0.082	0.067	–1.445	0.344	0.236
aglnon0206	0.792	0.528	2.208	1.667	0.119	5.295	1.023	0.327	2.782
ST	–1.379	0.420	0.252	–1.920	0.231	0.147	–3.405	0.055	0.033
SC	0.242	0.839	1.274	–0.054	0.959	0.947	-0.372	0.714	0.689
BC	0.476	0.634	1.610	0.151	0.866	1.163	–0.092	0.914	0.912
remote	–0.006	0.995	0.994	1.220	0.178	3.388	0.964	0.266	2.622

The reference category is: Most successful; Number of observations 155; (-2 Log likelihood): 300.00; $\chi 2 = 115.02$; Prob> $\chi 2 = 0.00$.
a. Primary h stands for education of head up to primary, Secondary h for education of head up to secondary, Female h for female headed household, Age W for age of workers in years, SLU for standard livestock unit, mig0104 for migration in both 2001/02 and 2003/04, com0406 for commuting in both 2003/04 and 2006/07, agliv2or6 for having agriculture with livestock either in 2001/02 or in 2006/07, aglnon0206 for having agriculture with livestock as well as non-farm livelihoods in both 2001/02 and 2006/07, and remote for dummy variable for poorly-connected village.
Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

Commuting route appears less pro-poor and migration route appears more pro-poor. Agriculture and/or livestock route decreases the probability of becoming unsuccessful or struggling relative to most successful households. On the other hand, the most diversified agriculture plus livestock plus non-farm route increases the probability of becoming unsuccessful or struggling relative to most successful households. This result is consistent with what we found in the previous analysis using transition matrices.

7 Role of livestock

Agriculture, livestock, non-farm, commuting, migration and diversification appear to be important routes to combat poverty. An important change noted in 2006/07 is that a share of income is coming from livestock related activities in commuting and migration. This is consistent with structural changes in the livestock sector being predicted due to growing demand for livestock products with income growth as in India (Delgado et al. 1999; de Haan et al. 2001). With the improvement in infrastructure and growing demand for livestock products, commuters are involved in livestock trade, milk collection/distribution, but progress is slower. The share of in-village income from livestock related activities reduced from about 8 to 3% in between 2001/02 to 2006/07. Livestock farming reduced considerably in the study areas in 2003/04 compared to 2001/02 (at an annual rate of 2.7%) due to drought related and disease problems as described in sections 3 and 5 (Akter et al. 2008). This result is not consistent with the growth being projected for the developing world where India is a major part (Delgado et al. 2001). The 2006/07 survey excluded households having no commuters/migrants, one may consider of a possibility of under representation of relatively larger livestock holders given that households having migrants keep fewer livestock. In 2001/02, the income share of livestock and related activities was 11% for the full sample and it was 8% for this sample. Further data inspection shows that the average holding in 2001/02 of the livestock keepers was slightly higher in the panel but it includes the largest farm of 2001/02 with 15.2 standard livestock unit and a new poultry farm. Using 2003/04 data, Akter et al. (2007) identified that commercial poultry farms and milch are growing but such growth is biased towards the relatively better off. To estimate the precise contribution of livestock towards poverty reduction, another livestock survey as in 2003/04 is necessary. However, from the evidence available, the contribution of livestock-related activities, other than cultivation, in the livelihood pathway in terms of income-earning is slowing down.

There are other roles of livestock. The contribution of animal traction and by-products is not known from the data. With the increase in commercial agriculture and enhanced use of mechanical power, the role of livestock in crop production is gradually reducing. In 2003/04 data, we noted that 30 holders (17% of the holders) did not report any income. They are very small holders having 10 or less units of livestock; more than a half had poultry. Others had either buffalo, or bullock, or calf, or cow, or small ruminant, four holders kept more than one type. Thus 17% of the holders kept livestock either to meet emergency needs (buffering function) or for home consumption adding nutrition (or for both buffering function and nutrition). About 36% of the holders reported selling livestock to meet emergency needs in three years; 33% of the sales revenue was being spent on shock/stress related matters and 47% of the sales revenue was spent to repay loan.

For certain seasonal activities like sugarcane cutting, migrants carry draught livestock and bullock cart. Income was not recorded separately in the livestock related jobs. Qualitative research conducted under LOP identified that 40% of the villagers from one of the study villages in Medak district of Andhra Pradesh migrated with livestock in 2001 earning Indian Rupee (INR)[1] 140–160 for each tonne of sugarcane cut and transported to the crushing unit (Deshingkar et al. 2008a). However, this activity is also showing a declining trend (Rao et al. 2006).

1. Indian Rupee (INR). In October 2008, USD 1 = INR 47.08.

Table 13 shows that livestock is a component of both farm and non-farm routes. Although the rate of success is higher through the non-farm route, diversification of non-farm income with farm and livestock sources could reduce the number of people who are struggling.

Regression analysis shows that households which keep livestock along with agriculture in any one period have lower risk of being unsuccessful/vulnerable.

8 Conclusion and policy implications

In this paper we have investigated poverty dynamics in relation to livelihood pathways and identified the role of livestock. Poverty fell considerably in the study area; from 45% in 2001/02 to 29% in 2006/07 with about 64% of the poor escaping absolute poverty and 23% of the non-poor falling into it. More than 41% of the households move in or out of poverty in a 6-year period beginning 2001/02. Poverty incidence differs among different caste categories, among landless, marginal and small farmers, and livestock holders and between locations. Poverty is proportionately higher among the scheduled tribes and backward castes. Poverty is diagnosed more among the landless and marginal farmers. It is located proportionally more in poorly-connected villages. Extreme poverty is also falling; the probability of being extremely poor in 2001/02 was 16%, which fell to 9% in 2006/07. However, the proportion (termed here 'vulnerable') remaining just above the poverty line is high; 62% of the households remain either extremely poor or vulnerable or move between these two categories in the two periods (2001/02 and 2006/07). This result has considerable implications for combating poverty. In particular, many vulnerable households could fall back into poverty as a result of diosyncratic shocks. Any poverty reduction strategy should target this group along with the extremely poor. Targeting should be done carefully: whilst remote villages require infrastructure development, well-connected villages are likely to require employment generation to stabilize income for those who are vulnerable.

Diversification of farm, non-farm and livestock activities appears to be the route that the majority of the households pursue in trying to improve their income situation, maybe as an adaptive strategy. Econometric analysis suggests that a 'farm with livestock route' appears the best in terms of escaping poverty, with only 14% remaining in poverty over the long term through this path. On the other hand, the risk of being unsuccessful is the lowest through the 'non-farm route'. This indicates that those who are able to pursue a single strategy may be with some degree of specialization, they are more likely to exit poverty. However, proportionately more households are struggling through these routes. In fact, very few households specialize in either farm or non-farm or livestock. This implies that poverty reduction strategies need to incorporate opportunities for the poor to enter into specialized non-farm activities. Expansion of training linked to certain activities is an option. At the same time, poor farmers and livestock keepers should have the opportunity to diversify income through non-farm activities.

Livestock is a common enterprise along with other farm and non-farm industries; around 50% of the households hold one or another type of livestock or earn income from livestock-related occupations, either in-village or outside the village through migration or commuting. Although income share earned from livestock directly is not high, holders get indirect benefit to keep it, such as buffering function, home consumption etc. Some livestock related jobs in the migration/commuting route are identified in the recent survey, predominantly in larger, commercial livestock units identified in our earlier study (Akter et al. 2007). Targeted trainings related to jobs in commercial livestock production may be helpful for the poorer to get employment. A resurvey of the panel would yield more, and more detailed policy recommendations.

Regression analysis shows that an increase in owned land decreases the probability of becoming unsuccessful or struggling. A similar relationship is obtained for the variables schooling, livestock

asset 2001/02, primary and secondary education of head, migration route and agriculture–livestock route. Household head having completed primary or secondary education has lower probability of becoming unsuccessful/struggling/less successful than the most successful households and the size of the effect is higher for those having secondary education. This means that investment in human capital development should be an important component of poverty reduction programs. Households having more family members are likely to be more unsuccessful/struggling and less successful relative to most successful category. Households which keep livestock along with agriculture in any one period, have lower risk of being unsuccessful/vulnerable.

In the sample, the majority of households experienced keeping at least one type of livestock, including chicken, ducks, goats, sheep, and/or cattle. It is therefore important to help them with pro-poor initiatives that include these enterprises. Pest and disease problems are identified as a major problem along with shocks and stresses. Extension support on better management of raising a number of livestock species along with crop agriculture could be a 'cargo net' for many poor farmers who are practising diversification through livestock.[1]

Success requires access to resources such as land, agricultural technology, and livestock. For those who are able to accumulate asset through regular savings or acquire them by some means, upward mobility is possible through either non-farm route or diversification of farm, livestock and non-farm activities. Livestock could bring success if risks arising from idiosyncratic shocks and diseases are minimized through appropriate policy measures, such as small stipends to meet certain unexpected expenditures.

Livelihood pathways to exit poverty appear complex. For example, the prevalence of poverty was lower among the farmers having livestock in 2001/02 but the trend reversed in 2006/07 for 2003/04 holders and the incidence was higher among the new holders in 2003/04. Prolonged drought is partially responsible but there may be other reasons for the failure of some commercial poultry farms which were relatively poorer. In the study locations, about 37% of the households which experienced decrease in livestock during 2001/02 to 2003/04 had to sell livestock due to domestic shock or stress, another 22% experienced decrease due to pest/disease problem, 91% of the farm households which sold to meet major expenses failed to restock. Without another livestock survey, it may be inappropriate to draw more specific conclusions regarding pro-poor initiatives through livestock, because 2003/04 data is drought-related and so livestock-related results are most likely to be a temporary phenomenon; the 2006/07 survey was carried out to update the knowledge on the evolving pattern of migration and essentially details on livestock enterprise were not collected. Specifically, we need to identify why the relatively poorer households which started commercial poultry farming in 2003/04 still remain poor and what type of program is necessary to improve their condition.

1. The strategy that helps the poor to climb out of poverty is often termed 'cargo net' (Barrett 2003).

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Appendix 1. Transition matrix showing mobility between quintiles, 2001/02 to 2006/07, Andhra Pradesh, India

% of total		Quintiles 2006/07					Total
		Bottom quintile	2	3	4	Top quintile	
Quintiles 2006/07	Bottom quintile	7.1	2.6	6.5	3.2	0.6	20.0
	2	3.2	5.8	3.2	5.2	2.6	20.0
	3	4.5	4.5	5.2	3.2	2.6	20.0
	4	3.2	3.9	2.6	3.9	6.5	20.0
	Top quintile	1.9	3.2	2.6	4.5	7.7	20.0
Total		20.0	20.0	20.0	20.0	20.0	100.0

Data source: Livelihood options study surveys: Rounds 2001.

Appendix 2. Percentage distribution of households by economic mobility and livestock farming, Andhra Pradesh, India.

Livestock farming	N	Unsuccessful	Struggling	Successful	Most successful	Total
Never holders	57	8.8	42.1	38.6	10.5	100.0
Always holders	51	13.7	35.3	23.5	27.5	100.0
Dropped in 2003/04*	25	16.0	32.0	24.0	28.0	100.0
New holders in 2003/04*	22	50.0	13.6	36.4	0.0	100.0
Total	155	17.4	34.2	31.0	17.4	100.0

*Stock information was collected in 2001/02 and in 2003/04. Entry/exit time was not recorded, can happen any time in between.
Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

Appendix 3. Frequency and percentage distribution of the major reasons for the decrease in livestock number in Andhra Pradesh in 2001–04

Major reasons for decrease	N	%
1. Loss of access to grazing/fodder	14	7.7
2. Poor markets for livestock and/or their products	1	0.6
3. Inadequate labour	17	9.4
4. Drought	12	6.6
5. Pest/disease problems	39	21.5
6. Had to sell to cover agriculture shock or stress	12	6.6
7. Had to sell to cover domestic shock or stress	67	37.0
8. Paying off debts	11	6.1
9. Others	8	4.5
Total	181	100

Data source: Akter et al. 2008, Livelihood options study: Panel survey 2005, ODI.
Note: In addition to reason 4, there are other drought-related causes such as 1, 6, and 7.

Appendix 4. Percentage distribution of all 360 households by livelihood pathways in Andhra Pradesh, 2001/02

Livelihood source	Without transfer	With transfer	Total	Without migration	With migration	Total
Agriculture alone	4.8	10.5	9.2	9.1	9.2	9.2
Livestock alone	2.4	0.4	0.8	1.9	0.0	0.8
Non-farm alone	7.1	8.7	8.3	11.7	5.8	8.3
Agriculture plus livestock	23.8	22.5	22.8	33.1	15.0	22.8
Farm plus non-farm	19.0	22.1	21.4	11.7	28.6	21.4
Farm plus livestock plus non-farm	38.1	31.2	32.8	22.1	40.8	32.8
Livestock plus non-farm	4.8	4.7	4.7	10.4	0.5	4.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Data source: Livelihood options study surveys: Rounds 2001–-02, 2003–04 and 2006–-07.

Appendix 5. Descriptive statistics of the variables used in the multinomial logit model for economic status, Andhra Pradesh, India

Variables	Unsuccessful		Struggling		Successful		Most successful	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Total land owned	0.73	1.23	0.63	0.87	4.24	16.62	3.19	5.09
Years of schooling in household	18.11	12.48	17.72	14.02	20.38	20.48	28.19	16.01
Landless proportion	0.52	0.51	0.43	0.50	0.37	0.49	0.19	0.40
Value of agricultural assets, log	1.78	3.81	2.14	4.00	2.33	4.07	3.54	4.76
Total livestock unit (SLU), 2001/02	0.81	1.26	0.90	1.30	0.95	2.64	1.79	1.90
Head has primary education	0.19	0.40	0.17	0.38	0.21	0.41	0.37	0.49
Head has secondary education	0.11	0.32	0.08	0.27	0.08	0.28	0.41	0.50
Age of head (years)	44.56	13.49	45.51	12.98	44.94	12.81	43.67	12.49
Number of persons in household	4.78	1.45	5.57	2.19	5.56	2.49	4.93	2.79
Female-headed household	0.11	0.32	0.13	0.34	0.04	0.20	0.04	0.19
Benefit index	0.44	0.70	0.32	0.64	0.33	0.66	0.59	0.69
Average age of working members (years)	32.47	10.49	31.71	8.54	32.41	9.69	30.21	9.26
SLU 2003/04	2.28	4.07	0.72	1.36	.86	1.70	1.19	1.62
Having migrants in both 2001/02 and 2003/04	0.37	0.49	0.57	.50	.67	.48	.67	.48
Having commuters in both 2003/04 and 2006/07	0.56	0.51	0.62	.49	.50	.51	.48	.51
Ag + livestock either in 2001/02 or 2006/07	0.11	0.32	0.06	.23	.08	.28	.07	.27
Ag+livestock+nonfarm both in 2001/02 and 2006/07	0.11	0.32	0.21	.41	.17	.38	.26	.45
Scheduled Tribes	0.07	0.27	0.06	.23	.02	.14	.07	.27
remote	0.26	0.45	0.40	.49	.48	.50	.33	.48
Valid N	27		53		48		27	

Data source: Livelihood options study surveys: Rounds 2001–02, 2003–04 and 2006–07.

Box 1: Summary information for sample districts and villages in Andhra Pradesh

Livelihood Options study in Andhra Pradesh was conducted in three contrasting districts from three different regions representing diverge historical, political and agro-ecological conditions and therefore distinct patterns of livelihood evolution and diversification. Two villages from each district were selected in consultation with district administration, academics, NGOs and other key informants; one was well-connected in terms of road connectivity, proximity to urban centres and markets and the other was relatively poorly-connected. Some diversity of the villages under each district with the name of region in brackets is shown below:

Chittoor (Rayalseema) OP (well-connected) and VP (poorly-connected)	Krishna (Coastal Andhra) KO (well-connected) and KA (poorly-connected)	Medak (Telangana) GU (well-connected) and MD (poorly-connected)
Semi-arid, tank and tubewell irrigated, well-connected with large cities, groundnut, paddy, mulberry, tomato	Agriculturally prosperous, canal irrigated, intensively farmed paddy, pulses, sugarcane	Semi-arid, socially backward, mainly tank and tubewell irrigated or rainfed agriculture, sorghum, paddy, cotton, maize
Backward castes have emerged as powerful in VP recently	Mixed caste but forward caste dominated	Traditional caste hierarchy
More equitable land holding	Polarized land distribution	Land distribution still along feudal lines in remote village
Both villages are drought prone but VP has more labour market links	KO better-off and well-connected than KA	GU lies in the industrial zone with recorded livestock keeping and MD is a remote village with livestock raising higher than GU
Rich keep more livestock	KO- livestock keeping is lower than poorer villages, lower castes keep more than the higher castes; KA- livestock raising is higher, higher castes keep more	
Livestock keeping is more stable in OP than in VP over the recent years		

Data was collected through three rounds beginning in 2001/02, repeated in 2003/04 and again in 2006/07 involving more than one survey in each round. The 2001/02 round began with a census covering 4747 households in all six villages. The census collected data on basic household characteristics on the household structure, education, age, gender, occupations, asset ownership and whether or not the household had a migrant. This was followed by 2 seasonal surveys covering a smaller stratified sample of 360 households (40–80 households per village depending on the size of the village). Stratification was done by land holding and caste. The primary purpose of the 2001/02 round was to collect data on livelihood diversification and data on livestock was minimal.

The next round in 2003/04 completed in early 2005 was undertaken with the specific purpose of collecting more detailed data on patterns of livestock keeping, migration and land distribution using three different questionnaires for the same sample. Another resurvey in two rounds on the patterns of migration was done in 2006/07. This is completed in April 2007 focusing on migrating households alone. It captures income from migration in detail as well as total household annual income from 37 different activity groups (up to 5 activity groups per household). From this final re-survey, a poorly-connected village (KA) was dropped due to very low levels of migration. In this study, we have chosen a panel of 155 households from 5 villages, which comprises income data for both the 2001/02 round and the 2006/07 round, making it possible to compare poverty status.