Pro-Poor
Livestock
Policy
Initiative

Poverty, Livestock and Household Typologies in Nepal

Irini Maltsoglou and Kiyoshi Taniguchi

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PREFACE

This is the thirteenth of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation. This is also Working Paper No. 30456 of the Agriculture and Development Economics Division (ESA).

Livestock is vital to the economies of many developing countries. Animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. For low income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock and livestock products in developing countries, though starting from a low base, is growing rapidly.

In this context, it is important to be able to understand the link between poverty and livestock and the possible impact of livestock policies on the poor. The aim of the analysis presented in this paper is twofold: firstly, to gain an in-depth understanding of the features that characterize the poor in Nepal so as to determine the role livestock plays in and for household's income and income sources; secondly, based on the findings, set up household typologies related to livestock to be used to identify household groups within the country to better target specific livestock policies. The analysis presented is based on the data collected in Nepal during the 1996-97 Living Standards Measurement Survey (NLSS I).

Disclaimer

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Keywords

Poverty, livestock, income, Nepal, home consumption, cash income, household typologies.

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EXECUTIVE SUMMARY

Even though the world has witnessed tremendous growth and significant improvements in living standards and overall welfare, poverty still remains dramatically present in today's society.

In Nepal the characteristics of the poor are far too apparent, it is one of the poorest countries in the world and has performed very weakly in terms of social development. Poverty levels are extremely high and income disparities are very evident across income groups. During the 1990s Nepal witnessed a period of improved economic growth, but political unrest over recent years led to a contraction in the economy in 2002. A ceasefire was announced at the beginning of 2003, this offers hope that the government will be able to gain strength again and re-start the economic reform processes.

Agriculture and livestock are key components of the livelihoods of the rural poor. Livestock make a substantial contribution to household livelihoods' and currently sustain the livelihoods of an estimated 700 million rural poor in developing countries. The demand for livestock and livestock products in developing countries is predicted to double over the next 20 years due to human population growth, increasing urbanization and rising incomes. More than 80% of the population in Nepal relies on the agriculture sector for employment and income generation. But agricultural development has been sluggish and, most importantly, has failed to keep the pace with population growth. Nevertheless, contrary to the relative decline of agriculture, the livestock production index has continuously been increasing over the last decades.

In this context, the aim of the analysis presented in this report is: firstly, to gain an in-depth understanding of the features that characterize the poor in Nepal and to determine the role livestock plays in and for household's income and income sources; and secondly, based on the findings, set up household typologies related to livestock to be used to identify household groups within the country and correctly target the impact of specific livestock policies. The analysis presented is based on the data collected in Nepal during the 1996-97 Living Standards Measurement Survey (NLSS I).

In the first part of the analysis we start off by investigating the socio-economic characteristics of the households including demographic characteristics, access to facilities and agricultural asset ownership. We then look at income levels, income sources and poverty levels based on the computed income aggregate. Finally we analyze the distribution of household assets by income tercile and regional subdivision of the data. Based on the findings of the initial part of the study we proceed to set up household typologies which group households according to the criteria elicited in the first section.

Overall we find that literacy rates remain low, that most households own land and livestock, that some of the rural areas are extremely isolated, that there is a large discrepancy between income in the rural and urban areas, and that agriculture, the main income source for the rural households, remains strongly subsistence based.

Livestock is found to contribute significantly to agriculture income both in the form of home production consumed within the households and agriculture cash income. The cash component proves to be especially important for the more isolated areas in which access to cash is very limited and for the landless households.

In conclusion we find that poverty in Nepal is mainly a rural phenomenon, where households mostly own land and livestock, and are extremely dependent on agriculture for household income and can depend on livestock for the little cash they have access to. This is a strong call for policy makers to ensure that policies aimed at targeting livestock are put in place, since this will indirectly target the large portion of rural poor in the country.

1. INTRODUCTION

Even though the world has witnessed tremendous growth and significant improvements in living standards and overall welfare, poverty still remains dramatically present in today's society.

As a multidimensional phenomenon, poverty, defined as "pronounced deprivation in well-being", is linked both to the presence of low income and to the lack of assets, such as education, health and adequate nourishment. From the multidimensional perspective, people are poor when their level of income does not allow them to buy the minimum amount of food required to carry out daily duties and tasks, nor to obtain a minimum level of education nor medical attention when necessary, that is, when they are not able to satisfy their basic needs (World Development Report 2000).

What complicates poverty further is that income levels and access to assets are intrinsically related and are simultaneously one the cause of the other. Low income will not allow people to access the resources necessary to improve their livelihoods. And, at the same time, lack of access to education, health and nourishment will lead to illiteracy and unemployment. The poor will be trapped in a vicious cycle, it is obvious then, that under these conditions, poverty can result in complete loss of hope and of any chance of accessing, not even a better life, but a decent human existence.

Agriculture and livestock are key components of the livelihoods of the rural poor. The majority (almost 70%) of the world's poorest people are located in rural areas and engaged primarily in subsistence agriculture where agriculture remains a principal source of income for the majority of the population. Livestock make a substantial contribution to household livelihoods' and food security and currently sustain the livelihoods of an estimated 700 million rural poor in developing countries. For many of these rural poor, livestock provide a source of income generation, improve household food security and nutritional status, and are often the only way of increasing assets and diversifying risks. The demand for livestock and livestock products in developing countries is predicted to double over the next 20 years due to human population growth, increasing urbanization and rising incomes (FAO, 2003).

In Nepal the characteristics of the poor are far too evident and poverty remains at endemic levels. Comparison of poverty levels over the last decades shows that the percentage of poor in Nepal remains practically unchanged and that, due to population growth, the actual number of poor people has increased (World Bank 1998).

The agriculture sector in Nepal employs 83% of the country's work force but still remains at very low yielding levels, especially when coupled with the increasing population and with the consequent increasing demand (World Bank, 1999). Most Nepalese households own livestock and land, although land ownership is becoming more and more fragmented due to population growth. The nutritional status of mothers and children under five, in Nepal, is extremely poor. Over the last 20 years, no improvement has been observed in the nutritional status of children and, at present, almost half the children are stunted and 11% are wasted. Nepalese women are highly affected by malnutrition. In the last 30 years, although the basic health services have expanded in Nepal, coverage still remains limited (ESN Country profile, FAO 1998).

In this context, the aim of the analysis presented in this report is: firstly, to gain an in-depth understanding of the features that characterize the poor in Nepal and to determine the role livestock plays in and for household's income and income sources; and secondly, based on the findings, set up household typologies related to livestock to be used to identify household groups within the country and correctly target the impact of specific livestock policies.

The document proceeds with a short overview of the current economic status in Nepal, the geography of Nepal and the agriculture sector and livestock. In section 3 we briefly describe the data set used for the analysis. Household characteristics by region are illustrated and discussed in section 4. Section 5 outlines household income, poverty measures, the methodology used, and household income sources related to livestock. In section 6, building on the information drawn from these sections, we proceed to set up household typologies based on the criteria elicited from the first part of the analysis. Household poverty and income sources are then re-visited according to the household typologies. Conclusions and main findings are reported in section 7.

The analysis presented is based on the data collected in Nepal during the 1996-97 Living Standards Measurement Survey (NLSS I).

2. NEPAL: BACKGROUND INFORMATION

2.1 Overview [1]

Nepal is one of the poorest countries in the world, it is land-locked amongst China and India and has an estimated population of 23 million people.

In 1998 Nepal reported an annual per capita GNP of $200 putting it along side some of the poorest countries in sub-Saharan Africa. According to the human development index, Nepal was ranked as 144 out of 174 countries by the UNDP's Human Development Report and has performed very poorly in terms of social development, even compared to other countries in the south Asian region. Poverty levels are extremely high, especially in the rural areas. Income disparities are very evident across income groups, whereby the top 10 percent of the population earn approximately the same as the bottom 50 percent.

For a number of decades before the 1990s, the Nepalese economy had been performing very poorly and virtually all the population in the rural areas were living in conditions of poverty. After the start of democratic rule in 1990, Nepal entered a period of economic reform covering most sectors of the economy and aimed at improving employment conditions, promoting economic growth and reducing poverty levels. Poverty alleviation was the main target of the Agriculture Perspective Plan (APP, begun in 1997), formulated by the government to accelerate agricultural development by promoting irrigation, roads and power, technology, fertilizer and four priority outputs (livestock, high-value crops, agribusiness and forestry). Nevertheless government instability and the insurgencies over recent years have arrested this slow process and have had negative impacts on the economy. And now, for the first time in decades, Nepal has witnessed a contraction in the economy during the financial year of 2002, mainly due to the escalation in the insurgency, an irregular monsoon and weak external demand. Agriculture growth fell from 5.5% in 2001 to 2.2% in 2002. Employment leveled at 47%, agricultural growth and industrial output dropped and tourist arrivals reduced by 40% in 2002. In January 2003 a ceasefire was announced, which offers hope that the government will be able to gain strength again and re-start the economic reform processes (Asian Development Bank, 2003).

2.2 Geography

Nepal covers a land area of 147 181 sq km, has an average length of 885 km and an average width of 193 km. (Refer to Annex II for maps of Nepal)

The country has a unique topography and lies between the southern lap of the Himalayas, bordering with India in the south and the People's Republic of China in the north. The altitudes in the country vary dramatically from a minimum of 60 m in the low lands to a maximum of 8 848m in the Himalayas, including seven of the ten highest mountain peaks in the world. With the exception of a small strip of flat land in the south, Nepal is mainly a rugged and mountainous country. Three geographical areas characterize Nepal and run horizontally parallel to one another, namely the mountains, the hills, and the Terai, the southern low lands. The mountains, hills and rural Terai contain respectively 35, 42 and 23 percent of total area, and 7, 46 and 47 percent of the total population. Generally, population is very unevenly distributed with very high population densities in the Katmandu area.

The geographical location of Nepal poses a strong limitation to its possibilities for trade. In the north the very difficult conditions of the bordering territory with China

[1] Information in these sections has been adapted from the Nepal Food Security and Vulnerability Profile of the World Food Programme (2000) and from the Common Country Assessment of the United Nations System (1999).

and the general remoteness and isolation of the areas preclude many opportunities for trade. Consequently trade is mostly carried out through and dependent on India.

2.3 The Agriculture and Livestock Sector

Approximately 3 million hectares of land are cultivated in Nepal. Generally, the proportion of cultivable land in Nepal is low and only accounts for 20% of total land area in the country. The remaining 39 and 41 percent respectively, are covered by forest and unproductive land that mainly has a value for ecotourism. Cultivated land is distributed amongst the mountains, hills and Terai, by 8, 50 and 42 percent respectively. Although population density in the mountain areas is low, when comparing population density per hectare of cultivated land the proportions are found to be comparable across all three regions.

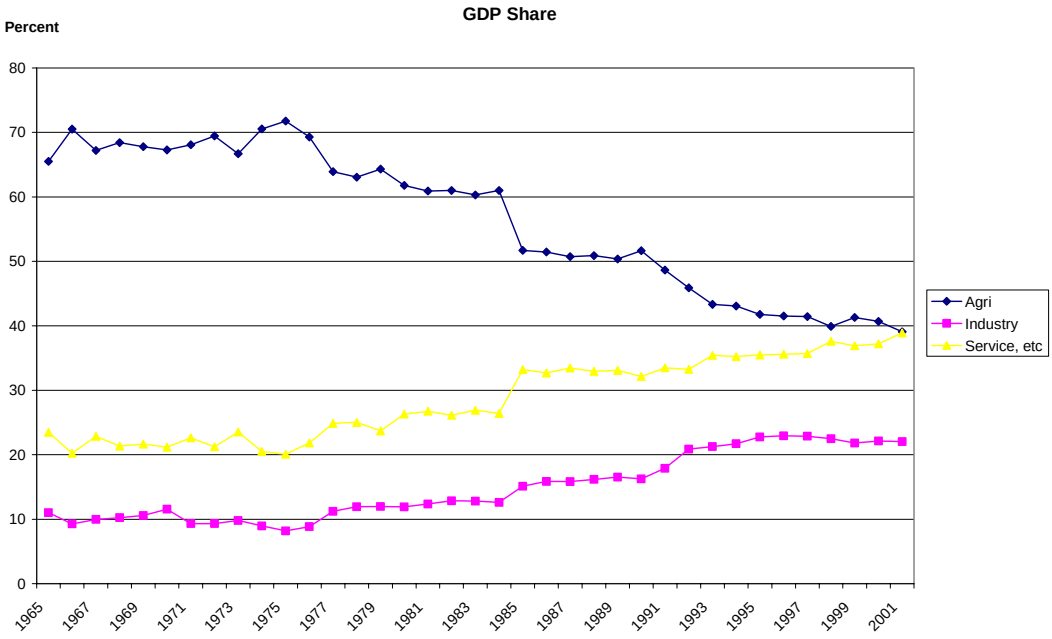
More than 80% of the population in Nepal relies on the agriculture sector for employment and income generation. But the agriculture sector has displayed an increasingly poor performance over the past few decades and its contribution to GDP has been in steady decline. Agriculture development has been sluggish and, most importantly, has failed to keep the pace with population growth. The consequences are evident and have resulted in overall increased poverty, food insecurity and malnutrition.

Figure 2.1 presents the agriculture, industry, and services sector shares out of total GDP. As mentioned above, in Nepal, the share of agriculture in GDP has been steadily declining. In 1965, the share of agriculture in GDP (value-added base) was 65.5 percent. In 2001, this share had reduced to 39.1 percent. This clearly shows that the relative importance of agriculture has been decreasing over time. The industry and service sector shares have been low compared to agriculture; however, the reduction in the agriculture share, over time, has been absorbed fairly equally by the other two. In 2001, the share of the agriculture sector and the service sector had converged to similar values.

Nevertheless, contrary to the relative decline of the share of agriculture out of total GDP, both the crop production and the livestock production indices increase. Figure 2.2 plots the variation in these indices over time (1989-91 base).[2] The livestock production index continuously increased from 51.8 in 1965 to 125.7 in 2001. This, in combination with the data reported in Figure 2.1, high-lightens the relative importance of livestock in farming and how it has been increasing dramatically over the last thirty years.

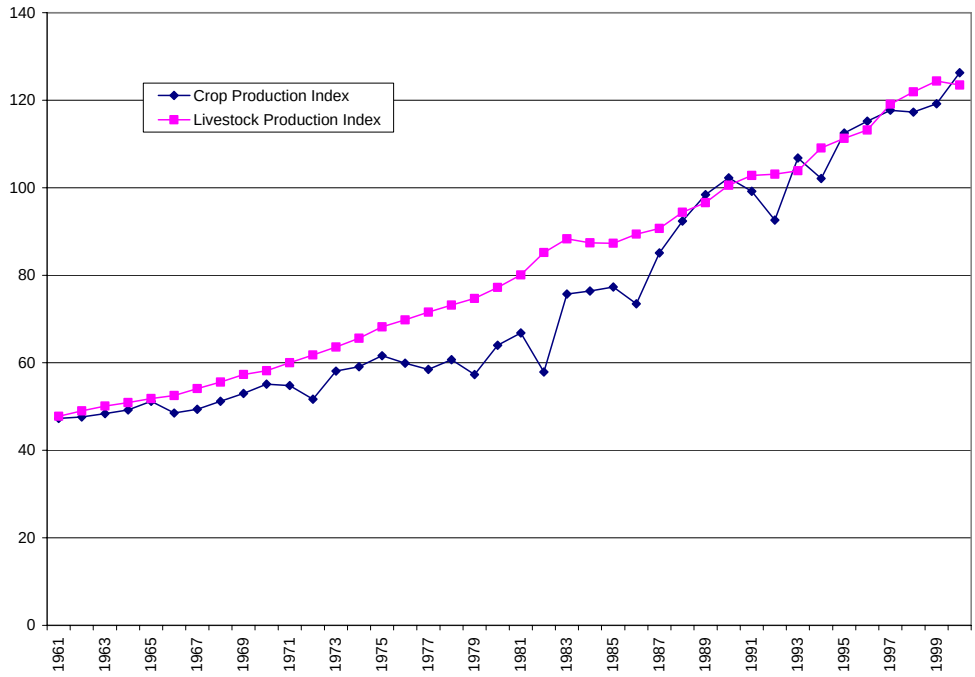
[2] The livestock production index includes meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins. The crop production index includes all crops except fodder crops (WDI Indicators CD-Rom, World Bank 2002).

Figure 2.1 : *GDP Share of Agriculture, Industry and Services in Nepal*



Source: World Development Indicator (World Bank, 2002).

Figure 2.2 : *Livestock and Crop Production Indices*



Source: World Development Indicator (World Bank, 2002)

3. THE NLSS I DATASET

The Nepalese Living Standard Measurement Survey (LSMS) covers information on a number of household welfare measurements, including household food and non-food expenditure, education, farming and livestock, non-farm enterprises/activities and other income sources.[3] The data utilized in this study is the Nepalese LSMS collected in 1995/96 (World Bank, 1996).

With reference to the 1991 Population Census of Nepal, a list of all the wards in the country (the smallest administrative unit) was compiled. The sample for the Nepalese LSMS (NLSS I) was selected with a two-stage sampling procedure with the aim to collect statistically accurate data from each ecological zone. In the first stage, the number of wards selected with probability proportional to size was 275 and covered 73 of the 75 districts in the country (the two districts not included were left out due to their low population density). In the second stage, a fixed number of households was selected from each ward. The final sample size covered 3 373 households.

Nepal is formed by three distinct ecological belts (the mountains, hills and the Terai low lands). The NLSS data can be subdivided according to these geographical characteristics and by area type (rural and urban). A breakdown of the data by urban and rural areas and by regions is presented in Table 3.1.

Four fifths of the sample households live in rural areas of the country, where the majority of the households are located in the hilly areas (51.6%), followed by the households in the Terai (36.3%) and more isolated mountain households (12.1%).

***Table 3.1**: Data distribution and number of household in the NLSS I sample.*

Household Distribution		
Sampling	**Households**	**Percent (%)**
Area Location		
Urban	716	12.2
Rural	2,657	78.8
Geographical Belt		
Mountains	409	12.1
Hills	1,740	51.6
Terai	1,224	36.3
Regions		
Mountains	409	12.1
Rural Hills	1,088	32.3
Rural Terai	1,112	32.9
Other Urban	428	12.7
Katmandu	336	10.0
Total	3,373	100.0

Source: NLSS (World Bank, 1996)

[3] Section adapted from survey and design implementation documentation for the NLSS I by the World Bank (1996).

In order to account for geographical diversity within Nepal, we subdivided the data sample according to the mountains, hills and Terai locations. In particular, we distinguished between the rural areas and the urban areas, while keeping the Katmandu valley separate due to its very different nature when compared to the rest of Nepal. Hence, the data was subdivided into the following five regions: Mountains (12.1%), rural hills (32.3%), rural Terai (32.9%), other urban areas (12.7%) and Katmandu (10%), where the percentages in the parentheses show the ratios of each categorical observation to the total sample. (See Table 3.1.)

4. HOUSEHOLD CHARACTERISTICS BY REGION

4.1 Demographic Characteristics

In this section we will briefly illustrate the main demographic characteristics of the sample households of interest to this study.

Within the regions, household size and the number of children per household remain fairly constant, but as expected are smaller in the Katmandu area. On average a household is composed of six individuals per household. The largest households are found in the rural Terai where households count on average 6.5 people per household. The average number of children per household for the whole sample is 2.5, varying from a maximum of 2.8 in the rural Terai to a minimum of 1.6 in Katmandu. The average age of the household head does not vary greatly across the sub-samples and, on average, the household head is 44.7 years old (See Table 4.1).

Literacy rates in Nepal are very low and only 38.4% of the households' heads report to know how to read and write. There is a large discrepancy in literacy rates between the urban and rural areas. Literacy rates are highest in hilly regions (36.5%) compared to the Terai (28.4%) and Mountains (24.2%). Approximately three quarters of the household heads are literate in Katmandu (72.6%), while only slightly more than half of the household heads living in other urban areas are literate (55.6%).

A small portion of the households are female headed (13.5%), while most households are male headed (86.5%). The share of female headed households does not vary greatly over the geographical locations, and the highest percentage of female headed households is found in the rural hills (17.1%).

***Table 4.1**: Household Socio-Demographic Characteristics*

Region	Sample		Household Size		Children per Household		Household Head Age		Literate Household Head	Female Household Head
	Freq.	%*	Mean	sd	Mean	sd	Mean	sd	%*	%*
Mountains	409	12.1	5.8	2.7	2.5	1.8	44.9	15.0	24.2	14.7
Rural hills	1,088	32.3	5.8	2.5	2.6	1.7	45.2	14.4	36.5	17.1
Rural terai	1,112	33.0	6.5	3.4	2.8	2.1	44.4	14.2	28.4	9.0
Other urban	428	12.7	5.9	3.0	2.3	1.9	44.6	14.2	55.6	14.0
Katmandu	336	10.0	4.9	2.1	1.6	1.2	44.0	14.5	72.6	14.6
Total	3,373	100.0	6.0	2.9	2.5	1.9	44.7	14.4	38.4	13.5

* Percentages refer to relevant subsample
Source: NLSS (World Bank, 1996), calculations by the author.

***Table 4.2**: Household Access to Facilities*

Region	Time to Road (hr)		Time to Health Post (hr)		Time to School (hr)		Time to Market (hr)	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Mountains	22.8	33.9	2.2	4.8	0.5	1.3	15.6	31.6
Rural Hills	10.5	21	1.8	3.3	0.6	1.6	8.2	19.2
Rural Terai	0.5	5.1	0.9	1.6	0.3	0.8	1.4	1.7
Other Urban	0.2	2.3	0.4	0.3	0.2	0.2	0.3	0.3
Katmandu	0	0	0.2	0.2	0.1	0.1	0.3	0.3
Total	6.3	18.7	1.2	2.7	0.4	1.1	5.1	16.3

Source: NLSS (World Bank, 1996), calculations by the author.

4.2 Access to Facilities

The Nepalese LSMS contains information on household access to a number of facilities. We investigate the average time households need to travel to reach a vehicle passable road, a market, a health post and a primary school.

What becomes immediately apparent is the general isolation of the mountainous and hilly regions. Average travel times to reach a vehicle passable road for these areas vary from 10.5 hours to 22.8 hours, respectively. Market access is also difficult since households have to travel between 8.2 hours in the hills and 15.6 hours in the mountains to reach a market. These two components show how market integration and access is obviously very problematic in the rural mountainous and hilly regions. The average time to reach a health post and a primary school improve compared to roads and markets. Average times traveled to reach a health post still remain significant though, being 1.8 hours in the hills to 2.2 hours in the mountains. Primary schools are found to be closer to the households, whereby on average it takes the pupils approximately 30 minutes to reach a school (See Table 4.2).

The remaining rural areas situated in the low lying Terai region, show a different trend compared to the rural areas in the hills and mountains. Road access improves compared to the other rural areas and, on average, households travel 30 minutes to reach a road. Schools as well are relatively close and children travel 20 minutes on average. In the case of the rural Terai, health posts and markets prove to be the facilities that are most difficult to get to. Households have to travel up to 1.4 hours to get to a market and 0.9 hours to reach a health post.

Katmandu and the other urban areas portray a considerably different scenario compared to the rest of the country. Access to roads, markets, health posts and schools is much easier for households living in these locations. A household in Katmandu travels on average 20 minutes to reach a market, 10 minutes to get to a health post, 5 minutes to get to school and has immediate access to a vehicle passable road. The trend in the other urban areas is similar, but average times to reach a road, school or health post are slightly higher, compared with Katmandu.

4.3 Land and Livestock Ownership

Nepal is a landlocked country where the poor and the rural population heavily depend on agriculture and agriculture assets for their income and livelihood. Consequently, in this section we investigate household ownership of agricultural assets, namely land and livestock, and extrapolate information required in the following sections.

Overall, most households from the sample own land (76%). The share of land owners is highest in the mountains and in the hills, and decreases progressively in the rural Terai and the urban areas (See Table 4.3).

***Table 4.3**: Household land ownership: Proportion of owners and plot sizes.*

Region	Land owners	Plot size (Ha)	
	%*	Mean**	sd
Mountains	96.8	1.16	2.2
Rural hills	95.3	0.90	1.9
Rural terai	76.2	1.24	1.7
Other urban	47.4	0.86	1.7
Katmandu	24.4	0.91	2.1
Total	76.0	1.05	1.9

* Percentages refer to whole subsample
** Means refer to land owners only
Source: NLSS (World Bank, 1996), calculations by the author.

***Table 4.4**: Household livestock ownership: Proportion of owners, herd size and types.*

Region	Livestock owners	Herd size (TLU)		Own LR	Own SR	Own Poultry	Own Pigs
	%*	Mean**	sd	%***	%***	%***	%***
Mountains	95.1	3.3	2.7	94.6	52.4	47.0	11.3
Rural hills	93.9	2.9	2.3	94.7	58.5	60.0	13.2
Rural terai	86.2	2.3	2.5	84.7	55.1	44.7	12.2
Other urban	37.1	0.6	1.1	69.8	44.0	44.7	2.5
Katmandu	13.7	0.1	0.6	54.3	23.9	50.0	2.2
Total	76.3	2.2	2.4	88.7	54.8	51.2	11.7

* Percentages refer to whole subsample
** Means refer to livestock owners only
*** Percentages refer to the regional livestock owners subsample
Note: LR=Large Ruminants, including cows, buffaloes and yaks.
SR=Small Ruminants, including sheep and goats.
Source: NLSS (World Bank, 1996), calculations by the author.

The land plots owned by each household are generally small and land is rather fragmented. Overall landholders own an average land plot area of 1.05 ha[4]. Plot size per household is found to be larger in the rural Terai, where most of the cultivated land is located and the average land plot area per household is 1.24 ha.

Livestock is an important resource in Nepal and overall 3 out of 4 households own livestock (See Table 4.4).

Virtually every household in the mountains and in the hilly areas own livestock. The percent is slightly less in the low land Terai. Fewer households own livestock in the urban areas, namely in Katmandu and in the other urban areas.

For the purpose of this study, the livestock species households can own were subdivided into four groups: large ruminants, small ruminants, poultry and pigs[5]. The large ruminant group includes cows, buffaloes and yaks. The small ruminant group encompasses sheep and goats. Generally each household can own a mixture of animals from the four groups described. At first we briefly look at the distributions of the ownership of these species by household and then we calculate the aggregate livestock herd size by household with the use of an equivalence measure.

Overall 88.7% of the households that own livestock own large ruminants[6], but the percentages are much higher in the rural areas compared to the urban areas (94.6% in the mountains, 94.7% in the rural hills and 84.7% in the rural Terai).

Amongst households that own livestock, 54.8% of households own sheep or goats. The percentage of households that own small ruminants does not vary greatly in the rural areas (52.4% in the mountains, 58.5% in the rural hills and 55.1% in the rural Terai) but is lower in the urban areas (23.9% in Katmandu and 44% in the other urban areas).

The picture in the context of poultry ownership is slightly different and mostly constant over all the sub-regions. Amongst the household that own livestock, 51.2% of households over the whole sample own poultry. When looking at the regional sub-samples, between 44.7% and 60% of households own poultry. Poultry ownership is relatively high also in Katmandu (50%) compared to the other animal groups.

On the other hand few households own pigs. The overall percent of households owning pigs is close to one tenth of all the households. The portion of households owning pigs in the urban areas is very small (less than 3%) and remains approximately around 12% in the rural areas.

In order to estimate an aggregate herd size for the households and be able to compare different herd types (cows, sheep, goats, etc.) the Tropical Livestock Unit (TLU)[7] equivalence measure was used. Based on the TLU equivalence scale we find that the average herd size for the whole sample is 2.2 TLU. The households that have the average largest herd size are located in the mountains where the average household herd size is 3.5 TLU. The rural hills and Terai have slightly smaller herd sizes, 3.1 TLU and 2.7 TLU respectively. In the urban areas the number of animals kept by individual households declines to 1.0 TLU in Katmandu and 1.5 TLU in other urban areas.

Summary

In conclusion, there is not much variation in household socio-demographic characteristics across the sub-samples, with the exception of literacy rates that

[4] The percentages refer to the sub-sample of land owners in each area.

[5] The Nepalese LSMS also includes a question on ownership of donkeys, mules and horses, but very little data was reported and therefore this information was not included in the analysis.

[6] The percentages refer to the sub-sample of livestock owners in the relevant area.

[7] Tropical livestock conversion units used are as follows: cattle = 0.70, sheep and goats = 0.10, pigs = 0.20 and chicken = 0.01. Please refer to Otte and Chilonda (2002) for a more complete discussion.

remain extremely low in the rural areas and also considerably low in the other urban areas excluding Katmandu. The mountains and rural hills are the areas that mostly suffer from isolation and for which connection to facilities, including roads, markets and primary schools, is particularly difficult. The rural Terai is much better connected to the facilities indicated and, in this, is more similar to the urban areas.

We find that most households in the rural areas own land, more so in the mountains and in the rural hills. Land ownership is slightly less in the rural Terai but the average land plot in this region is larger compared to the rural hills and mountains. Almost all households in the rural areas own livestock and the largest average household herd sizes are found in the mountains and rural hills. Almost all households own large ruminants, and, to slightly smaller extent, small ruminants and poultry. Pig ownership is not very widespread.

5. HOUSEHOLD INCOME, POVERTY AND INCOME SOURCES

5.1 Total Household Income: Calculation and Distribution

Total household income was calculated as the aggregate of farming income, wage income, rent income, non-farm income and other income. Farming income included all revenues from crops, livestock, agricultural assets and foregone income from food production consumed within the household. Wage income included income from non-agricultural work and agricultural work. Rent income was calculated as net dwelling rent. Non farm income was derived from income gained from non-farm enterprises. Other income included income from remittances and dividends of any savings minus transfers out of the household. [8]

The distribution of total income estimates per household illustrates the large disparities in income earnings across Nepal. The diversity in income levels in the regional areas of Nepal demonstrates how the country is sharply divided between the low income rural areas and the Katmandu valley and other urban areas. In the rural areas, the average total household income is approximately 27% of the average income earned in Katmandu and in the urban areas (See Table 5.1)[9] .

By looking at the regional subdivision of the data in more detail, we better observe the large discrepancy in average income between the rural areas in the mountains, hills and Terai and the urban areas in Nepal. Although rural income does not vary greatly across the regions, households with the lowest average income live in the mountains, and compared to households in Katmandu, earn approximately 1/5 of the income earned in the Nepalese capital.

Households are observed to earn different average total incomes according to the gender of the household head. We find that female headed households earn approximately 88% of the average male headed households' total income

Literacy is strongly correlated with average household income. Households with an illiterate household head earn on average an income that is approximately 2/5 of the income earned by households with a literate household head.

[8] Values reported are for current (the survey year) annual household income. Please refer to Annex I for a list of the components of total household income.

[9] The average exchange rate for the Nepalese Rupee in 1996 was 56.692 NRs for 1 US$, (Asian Development Bank 1999).

***Table 5.1**: Total annual household income by sub-division* [10]

Region	Mean (NRs.)	Stnd. Dev. (NRs.)	Median (NRs.)	Frequency
Area Location				
Urban	114,113	179,983	72,400	696
Rural	30,980	36,766	22,070	2,632
Region				
Mountains	26,564	31,588	18,810	409
Rural Hills	32,526	40,131	23,270	1,082
Rural Terai	30,107	34,359	21,504	1,094
Other Urban	96,386	203,882	58,125	417
Katmandu	128,142	127,422	95,660	326
Livestock Ownership				
Livestock	35,093	46,543	23,368	2,565
No Livestock	92,986	171,259	54,500	763
Gender of Household Head				
Male	49,162	95,151	26,978	2,878
Female	43,273	92,157	19,647	450
Household Head Can Read and Write				
Yes	74,688	140,240	42,876	1,324
No	29,671	42,216	19,450	2,023
Total	48,366	94,760	25,943	3,328

Source: NLSS (World Bank, 1996), calculations by the author

5.2 Poverty and Inequality Measures

Numerous methodologies to measure income inequality and poverty have been developed over recent years, but a detailed discussion of all possible measures is beyond the scope of this study. Therefore we briefly introduce the measures used in this analysis and refer the reader to Fields (2001) for a more detailed discussion.

In this study we will use the Foster, Greer, and Thorbecke (FGT(a)) class of poverty measures FGT(a) (1984). All poverty measures are based on the definition of a poverty line measurement, which represents the level of income below which households are considered to be poor. The parameter "a" is a measure of poverty aversion. As "a" increases, the sensitivity of the measure to the poorest of the poor, that is the headcount, poverty gap or the squared poverty gap, increases. The FGT(a=0) measures the poverty headcount, the proportion of population under the poverty line, a measure of the direct incidence of poverty. The FGT(a=1) is the average normalized

[10] By close investigation of the total household income data, it was found that 45 total household income values reported were inconsistent and were dropped from the sample.

poverty gap, which is more sensitive to the depth of poverty as it accounts for how far below the poverty line the poor lie. FGT(a=2), the average squared normalized poverty gap, squares the average distance between the poverty line and the individual's income and therefore is more sensitive to the poorest of the poor and to the severity of poverty (See Box 5.1) .

The Gini coefficient will be used to measure the degree of inequality distribution in income. A formal definition of the Gini coefficient is presented in Box 5.1. According to the Gini coefficient inequality can vary from 0 to 1. When the Gini coefficient is equal to 0, income is fully equally distributed. When the Gini coefficient is equal to 1 income is extremely unequally distributed.

***Box 5.1**: Poverty and Inequality Measures*

Poverty

The **Foster Greer Thorbecke** class of poverty measures are defined as

$$P_a(x;z) = (1/n)\sum_{i=1}^{q}(g_i/z)^a$$

where x = income

n = total number of households

q = number of poor households with income no greater than z

$g_i = (z - x_i)$ is the income shortfall of the i[th] household

$z > 0$ is the predetermined poverty line

a is a measure of poverty aversion (measures with larger a are more sensitive to the poorest poor)

for $a = 0$ P_a will be equal to the poverty headcount ratio

$a = 1$ P_a will be equal to the normalized poverty gap

$a = 2$ P_a will be equal to the squared normalized poverty gap ratio

Inequality

The **Gini Coefficient** is defined as

$$G = \frac{-(n+1)}{n} + \frac{2}{n^2 \mu_x}\sum_{i=1}^{n} i x_i$$

where recipients are ordered from lowest to highest income and

x_i = income of recipient i

μ_x = average income

n = total number of recipients

Source: Fields (2001) and Foster, Greer, and Thorbecke (1984)

5.3 Poverty and Inequality in Nepal: An Overview

The poverty line is estimated based on minimum expenditure requirements for food, and non food items, such as clothing and shelter. The World Bank calculated the poverty line for Nepal, based on the NLSS survey, to be NRs 4,404 per year per capita (World Bank 1999).

The following poverty analysis is based on this estimate and levels and depth of poverty will be assessed in comparison with this poverty line (See Table 5.2).

***Table 5.2**: Poverty and inequality measures by characteristic.*

Characteristic	Headcount	Poverty Gap	Severity	Gini Coefficient
	FGT(a=0)	FGT(a=1)	FGT(a=2)	
Total	0.540	0.237	0.141	0.491
Area Location				
Urban	0.216	0.099	0.065	0.538
Rural	0.565	0.248	0.147	0.439
Belt				
Mountains	0.596	0.264	0.148	0.426
Hills	0.460	0.183	0.098	0.510
Terai	0.610	0.286	0.182	0.446
Region				
Mountains	0.596	0.264	0.148	0.426
Rural Hills	0.512	0.205	0.110	0.423
Rural Terai	0.628	0.295	0.187	0.434
Other Urban	0.297	0.136	0.090	0.548
Katmandu	0.115	0.032	0.014	0.453
Literacy				
Yes	0.369	0.128	0.063	0.492
No	0.630	0.295	0.181	0.444
Livestock Ownership				
Yes	0.551	0.233	0.137	0.433
No	0.471	0.259	0.184	0.619
Gender				
Male	0.538	0.233	0.137	0.484
Female	0.556	0.262	0.167	0.536

Source: NLSS (World Bank, 1996), calculations by the author.

The analysis undertaken of the whole NLSS sample yields a poverty head count of 54%, namely 54% of the total population earns less than what they would need to meet

minimum living standards requirements. The Gini coefficient for the total sample is 0.49.

The incidence of poverty in the rural areas proves to be approximately three times higher than poverty in the urban areas. Poor people in rural areas represent 56.5% of the population, while 21.6% of the households are below the poverty line in urban areas. Poverty in the rural areas is also found to be deeper and more severe, since the poverty gap and squared poverty gap measures are higher. Inequality in income distribution also varies between rural and urban areas, where distribution of income is more unequal in urban areas.

When looking at the regional distribution of the data, the poverty head count goes up to 59.6% in the mountains and 62.8% in the rural Terai and 51.2% in the rural hills. In addition poverty is deepest and most severe in the rural Terai. The percent of the poor decreases approximately by half (the poverty head count is 29.7%) in other urban areas and is approximately equal to one sixth in Katmandu, when compared to the poorer areas. This illustrates how the divide between the minimum living standards requirement, the poverty line, and actual income declines sharply in Katmandu and, once again, is evidence of the large discrepancies found across Nepal (See Box 5.2).

Poverty headcount figures for literates show that increased education is strongly correlated with decreased poverty levels. The proportion of households with a household head that can read and write that are poor is 36.9% compared to 63% for households with illiterate household heads. Literate households also face less acute and severe poverty whereby literacy assists in reducing the poverty gap and the squared poverty gap. Inequality in income distribution rises slightly for households that have literate household heads

The proportion of poor households that own livestock (55.1%) is higher when compared to households with no livestock (47.1%). This ties in with the discussion in the previous section where we showed that the poorer households live in rural areas and own livestock. In addition, livestock owners are less stricken by the severity of poverty when compared with households that do not own livestock. In fact both the poverty gap and the squared poverty gap measures are smaller. The distribution of income is also improved for households that own livestock compared to non-owners

Gender of the household head is not found to greatly affect the poverty headcount. Interestingly though, we observe that the poverty gap and the squared poverty gap measures are both higher for female households. Therefore poverty for female headed households is more acute and also income is more unequally distributed for female headed households.

***Box 5.2**: Using income as a welfare measure.*

In order to assess living standards and wellbeing of households it is necessary to estimate a measure of household welfare. Generally, household welfare is either measured by household expenditure or by household income.

As widely discussed in the relevant literature, in developing countries, household expenditure is considered a better measure of household welfare as it is better able to capture household's consumption capabilities. The two main reasons given for this is that some components of household consumption are usually measured more accurately than income and that consumption is less susceptible to income volatility, especially in the context of rural households in developing countries which strongly depend on agriculture income.

Notwithstanding the validity of consumption as a measure of household welfare, household income can be a more appropriate measure when wanting to investigate household opportunities and access to resources and income sources, especially in the context of policy initiatives.

In this study we wish to determine the role livestock plays in household income and to look at income sources related to livestock. Therefore we consider an income measure of household welfare more relevant to the analysis carried out.

Below we include the poverty estimates for common sub-samples. As expected, we find that the income based estimates of poverty and inequality (calculations by the author) are higher compared with the consumption based estimates (calculated by the World Bank).

	World Bank Estimates (Consumption based) [1]			Author Estimates (Income based)		
	Head Count	**Poverty Gap**	**Squared Poverty Gap**	**Head Count**	**Poverty Gap**	**Squared Poverty Gap**
Belt						
Mountain	0.56	0.185	0.082	0.60	0.264	0.148
Hills	0.41	0.136	0.061	0.46	0.183	0.098
Terai	0.42	0.099	0.034	0.61	0.286	0.182
Sector						
Urban	0.23	0.070	0.028	0.22	0.099	0.065
Rural	0.44	0.125	0.051	0.57	0.248	0.147
National	0.42	0.121	0.050	0.54	0.237	0.141

Source: Nepal Living Standards Survey (NLSS), 1995/96

[1] Extracted from Lanjouw et al. in the World Bank (1999)

Based on an estimated poverty line of Rs 4,404 per Person per Annum (World Bank, 1999)

We find that a considerable difference exists in the poverty estimates for the Terai area. One reason for this may be that, in the Terai a larger share of income comes from enterprise income which is often a greater source of underestimation and under-reporting.

5.4 Income Sources

Nepal remains a country that heavily relies on agriculture as the main source of income. We find that overall agriculture accounts for 52.7% of total household income. Wage income, enterprise income, rent income and other income have a decreasing order of importance as household income sources (See Table 5.3).

Furthermore, the importance of different income sources varies between rural and urban areas. In the rural areas, agriculture is the main income source, contributing on

average between 60.8% of total household income in the rural Terai and 71.2% to total household income in the mountains. In the urban areas, income sources are more diversified although in other urban areas excluding Katmandu, agriculture still provides 19.4% of total household income. Wage, rent and enterprise income are the largest sources of income in the urban areas.

***Table 5.3** : Total household income shares*

Region	Farm	Wages	Rent	Enterprise	Other
Mountains	71.2	7.6	10.8	4.0	6.4
Rural Hills	64.9	10.7	8.3	6.3	9.8
Rural Terai	60.8	13.2	7.8	11.0	7.2
Other Urban	17.8	25.6	24.1	23.1	9.4
Katmandu	6.5	36.8	21.9	28.7	6.1
Total	52.7	15.6	11.7	11.9	8.1

Source: NLSS (World Bank, 1996), calculations by the author.

5.5 Farm Income and Livestock

Farm income includes net-revenues from crops, livestock sales and purchases, livestock production, net-revenue from agriculture assets, net agriculture land rent and foregone income from home production.

There is little variation in farm income across the rural regions, and, in these areas, agriculture represents the principal source of income, as noted previously (See Table 5.4).

***Table 5.4** : Household farm income*

Region	Mean (NRs.)	Stnd. Dev. (NRs.)	Median (NRs.)
Mountains	16,901	14,811	12,540
Rural Hills	17,690	15,032	13,981
Rural Terai	17,454	21,420	11,667
Other Urban	7,971	15,309	1,200
Katmandu	3,880	16,377	0
Total	14,945	18,156	10,118

Source: NLSS (World Bank, 1996), calculations by the author.

We subdivide farm income into two components, namely home production or subsistence agriculture income (foregone income from agriculture production produced by the household and consumed within the household) and farm cash income (which includes crops and livestock net revenues, net revenue from agriculture assets and agriculture land rent). Overall, subsistence agriculture contributes 43% to total household income and farm cash income provides for 9.8% of total household income.

In the rural areas, farm income remains prevalently subsistence based, and makes up for the largest share of farm income. In the more isolated mountain areas 90.4% of agriculture income comes from home production, and contributes 63.3% to total household incomes. Moving from the mountains into the rural hills and the rural Terai, the importance of home production for total household income declines but still remains a very large part of total income, 54.8% and 45.7% respectively. In the urban areas the importance of farm income for household livelihoods is comparatively much lower but is still found to be mostly subsistence based (See Table 5.5).

***Table 5.5**: Contribution of home production income and farm cash income to household income.*

Region	Mean Income (NRs.)	Share of Farm Income (%)	Share of Total Income (%)
Home Production			
Mountains	14,439	90.4	63.3
Rural Hills	14,270	86.2	54.8
Rural Terai	11,892	78.6	45.7
Other Urban	6,002	89.0	14.5
Katmandu	2,320	90.2	5.2
Total	11,303	84.5	43.0
Farm Cash			
Mountains	2,461	9.6	7.9
Rural Hills	3,419	13.8	10.1
Rural Terai	5,562	21.4	15.1
Other Urban	1,969	11.0	3.3
Katmandu	1,560	9.8	1.3
Total	3,642	15.5	9.8

Source: NLSS (World Bank, 1996), calculations by the author.

On the other hand, the contribution of farm cash income remains low in the rural areas. This is especially the case in the more isolated rural hills and mountain areas, 10.1% and 7.9% respectively, once again underlining the remoteness of these areas. In the rural Terai the contribution of farm cash income to household income increases to an average of 15.1% of total household income (See Table 5.5).

Overall, we find that livestock contributes significantly to household income in the rural areas. In the rural hills and mountains, livestock accounts for 12.9% and 10.6% of total household income respectively. The contribution of livestock to total household

income in the rural Terai is slightly less but still accounts for 8.8% of total household income (See Table 5.6).

Livestock contributes to farm income in two ways. Firstly, livestock directly provides farm cash income through the net sale of livestock and livestock products. Secondly, it contributes to forgone income from household home production within which livestock products for home use are included. We investigate these two components separately. The contribution of livestock home production to total household income is 4.9% and the contribution of livestock cash income to total household income is 3.9%.

Table 5.6 : *Contribution of livestock home production income and livestock cash income to household income*

Total Livestock (Home Production and Farm Cash)			
	Region	Share of Total Income (%)	
	Mountains	10.6	
	Rural Hills	12.9	
	Rural Terai	8.4	
	Other Urban	3.3	
	Katmandu	1.0	
	Total	8.8	
Livestock Home Production			
Region	Mean Income (NRs.)	Share of Home Production Income (%)	Share of Total Income (%)
Mountains	1,899	11.1	7.1
Rural Hills	2,403	14.0	7.5
Rural Terai	1,183	9.2	3.9
Other Urban	1,052	12.5	2.1
Katmandu	271	7.4	0.5
Total	1,562	11.5	4.9
Livestock Cash			
Region	Mean Income (NRs.)	Share of Farm Cash Income (%)	Share of Total Income (%)
Mountains	1,094	44.4	3.5
Rural Hills	1,751	47.6	5.4
Rural Terai	1,236	32.2	4.6
Other Urban	503	31.9	1.2
Katmandu	1,176	29.5	0.6
Total	1,288	39.9	3.9

Source: NLSS (World Bank, 1996), calculations by the author.

In the rural areas, the contribution of livestock products for home consumption to total home production varies from 9.2% in the rural Terai to 14% in the rural hills and 11.1% in the mountains. The corresponding contributions to total household income are 7.5% in the rural hills, 7.1% in the mountains and 3.9% in the rural Terai.

The sale and purchase of livestock and the sale of livestock products is part of rural households' farm cash income and is an important source for cash income. In the mountainous areas 44.4% of the farm cash income comes from livestock and 47.6% in

the rural hills. In the rural Terai, livestock cash income contributes 32.2% of total farm cash income. Therefore, although the households in the rural hills and mountains remain considerably isolated with little access to markets and mostly producing for home consumption, livestock is an important source of cash income, especially since the influx of cash income in these remote areas is extremely low.

Finally, within livestock home production we distinguish between dairy home production and meat home production. We find that most home production income comes from dairy production versus meat production, especially in the rural hills and mountains (See Table 5.7).

***Table 5.7** : Contribution of dairy and meat production to home production income and total household income.*

Region	Mean Income (NRs.)	Share of Home Production Income(%)	Share of Total Income (%)
Dairy			
Mountains	1,678	9.4	6.1
Rural Hills	2,070	11.9	6.3
Rural Terai	1,041	7.5	3.2
Other Urban	950	10.9	1.9
Katmandu	254	6.6	0.4
Total	1,365	9.7	4.2
Meat			
Mountains	221	1.6	1.0
Rural Hills	333	2.2	1.2
Rural Terai	142	1.7	0.6
Other Urban	102	1.7	0.2
Katmandu	17	0.8	0.0
Total	196	1.8	0.7

Source: NLSS (World Bank, 1996), calculations by the author.

5.6 Income Levels and Asset Distribution

In order to assess the relevance and variation in distribution of household assets across income groups in the various regions and possible similarities between regions, we now investigate asset ownership levels by income groups and by regions. We focus on the three rural areas discussed so far and analyze the urban areas jointly, since the urban areas are generally a separate case compared to the rural areas. Income is subdivided into three terciles, namely low income, middle income and high income. Based on the analysis in the previous sections, we select some key demographic characteristics of the household, household access characteristics and agriculture asset ownership, especially relevant for the rural households which heavily rely on farm income for their livelihoods.

Agricultural assets include the average household herd size (TLU) and the average household land area. Household access characteristics are also considered assets in this context, since being able to easily access a road or a market can strongly improve households' livelihood conditions. We use the average time households take to reach a vehicle passable road (hours) and the average time a household takes to reach a market (hours). The key demographic characteristics we use are the average household size, the gender of household head and the level of education of the household head [11].

In the mountain areas we find that amongst the households' demographic characteristics, education plays a key role in reaching higher income levels. Some variation in income levels is also found according to the variation in the size of the household. Time taken to access a market varies across income levels and is the lowest for the higher income tercile. Herd size and land size vary across terciles, but the main difference is between the lowest income tercile and the middle and high income terciles (See Figure 5.1).

In the case of the rural hills, the picture portrayed is very similar to the one described for the mountainous households. Increased levels of education, reduced time to market, larger household size and herd size are found to be correlated with higher household income. Average land area per household is found to be more equally distributed across income levels (See Figure 5.2).

In the rural Terai the scenario presented starts to vary considerably from the picture described in the cases of the mountains and the rural hills. Household herd size and household land area vary across income terciles. In fact the percentage of households in the rural Terai that do not own land and do not own livestock are higher compared to the mountains and rural hills. Decreased time to access a vehicle passable road is also correlated with higher income in the case of the rural Terai. In fact in the mountains and rural hills travel times to reach a vehicle passable road remain extremely high. Education and household size are correlated with higher income in the rural Terai too (See Figure 5.3).

Trends in the urban areas are different from those found in the rural areas. Higher income is not correlated with livestock ownership but still remains correlated with land ownership. Higher education and better access times to markets is also correlated with higher incomes (See Figure 5.4).

[11] The values represented in the graphs are the average subsample values normalized by the whole sample mean.

***Figure 5.1**: Mountains: Asset distribution by income terciles.*

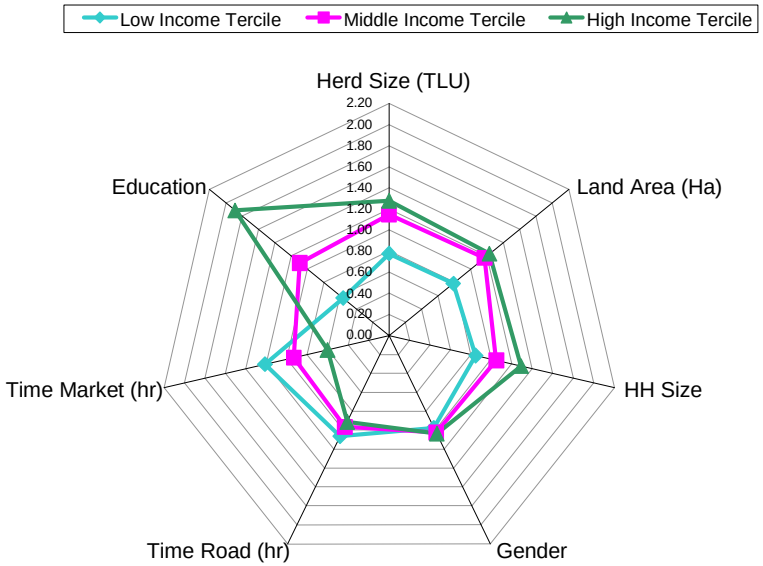


***Figure 5.2**: Rural Hills: Asset distribution by income terciles.*

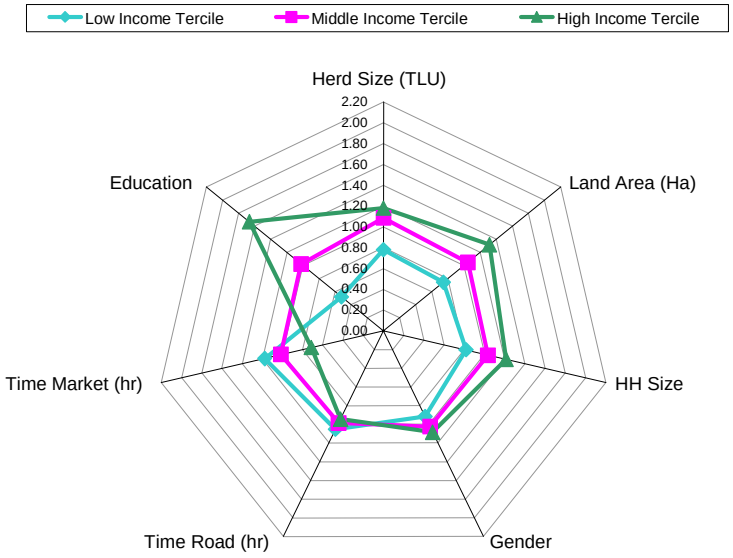


***Figure 5.3**: Rural Terai: Asset distribution by income terciles.*

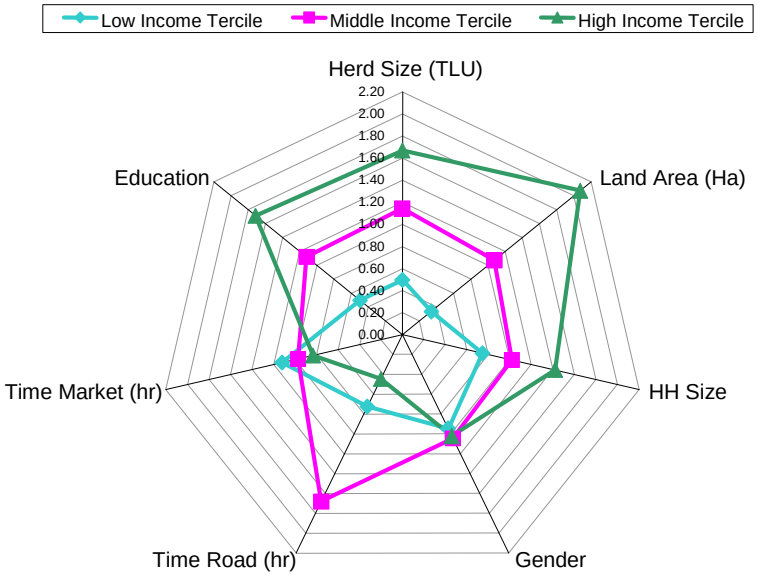
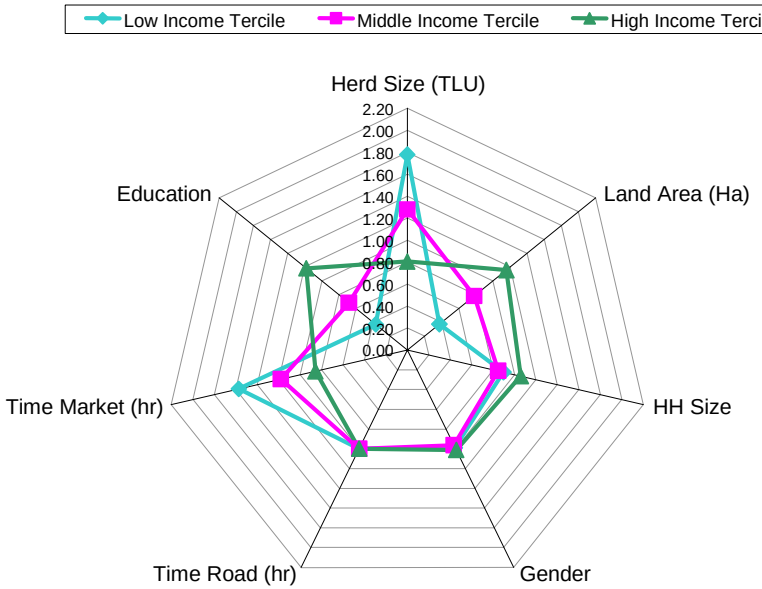


***Figure 5.4**: Urban: Asset distribution by income terciles.*



Summary

In conclusion, the initial picture that is drawn from the analysis up to this point is one in which households living in rural areas have lower incomes and depend prevalently on agriculture both for subsistence and for cash income.

We find that income poverty is much higher in the rural areas compared to the urban areas, as would have been expected. We find a discrepancy in our results compared to poverty levels reported by the World Bank (1998) in the rural Terai, but this might be explained by the larger portion of income derived from enterprise income in the rural Terai compared to the other rural areas. We also find that although the poverty head count increases for livestock owners, poverty is less extreme amongst livestock owners versus non livestock owners.

For their income, we find that households in the rural areas heavily depend on farm income. Households' farm income has two components, namely farm home production and farm cash income, but subsistence agriculture remains the main contributor to farm income in the rural areas. We find that livestock contribute significantly to total household income in the rural areas. Livestock are an input both for household farm home production income and farm cash income, but we find that households use livestock mostly for home production, especially in the mountains and rural hills. Nevertheless, especially due to the remoteness of these areas, livestock are found to be an important cash source for the little cash the households in these areas have access to. In home production, livestock are mostly used for dairy production versus meat production.

By looking at the asset distribution, we find that within the rural areas agriculture assets are correlated with higher income levels, especially in the rural Terai. From this section of the analysis we conclude that the conditions in the rural hills and mountains are similar, while the rural Terai remains a more separate case. Households' asset distribution patterns in the urban areas are considerably different, although land ownership is still found to be an important asset.

6. HOUSEHOLD TYPOLOGIES

6.1 Typology Breakdown

Household typologies are a useful way of categorizing data since they can subsequently be used in analyses that address households' behavioral response following changes that affect resource allocation, the environment and the opportunities in which the households live. Based on the findings from the previous sections, we proceed to set up household typologies for the Nepalese households analyzed.

Up to this point we have given a general overview of the agriculture assets households own and of poverty according to the regional subdivision used throughout the analysis. The main conclusions we came to are that Nepal is sharply divided between rural and urban areas and that the characteristics of households living in the rural areas are very different from the households living in urban areas. We also found that households living in the rural Terai had better access to facilities, including roads and markets, while the mountainous and rural hilly areas remained strongly isolated. Households in rural areas rely on livestock and land as a source of income and generally earn incomes that are much lower compared to the urban areas. By investigating households' asset distribution by income level, we also found that the distribution of assets in the mountains was rather similar to the situation in the rural hills and different from the rural Terai.

Based on these findings, we now set up the household typologies using the three criteria found to be most significant:

1. Location: Urban, rural Terai or rural hills and mountains
2. Land area owned: household land area (ha)
3. Livestock ownership: household herd size (TLU)

When clustering the households, it is also important to ensure that the number of groups does not get too large and the number of households within each group too small, since the analysis would then become unmanageable. With this in mind and based on the three criteria listed above and the information elicited in the previous sections, we subdivide the data into twelve types, based on location, livestock and land ownership, namely the urban typology (2 subgroups), the rural Terai typology (5 subgroups) and the rural hills and mountains typology (the same 5 subgroups as for the rural Terai) (See Table 6.1).

***Table 6.1** : Typology criteria and breakdown*

Typology	Groups	Nomenclature	Location	Livestock	Land
Urban	1	No livestock	Urban	Yes	-
	2	With livestock		No	-
Rural Terai	1	Landless, no livestock	Rural Terai	No	No
	2	Landless, with livestock		Yes	No
	3	Marginal land, less than 2 TLU		< 2TLU	0-1 ha
	4	Marginal land, more than 2 TLU		> 2TLU	0-1 ha
	5	Non-marginal land		-	More than 1 ha
Mountains & Rural Hills	1	Landless, no livestock	Mountains & Rural Hills	No	No
	2	Landless, with livestock		Yes	No
	3	Marginal land, less than 2 TLU		< 2TLU	0-1 ha
	4	Marginal land, more than 2 TLU		> 2TLU	0-1 ha
	5	Non-marginal land		-	More than 1 ha

Source: NLSS (World Bank, 1996), calculations by the author.

Since households living in urban areas are generally better off when compared to households living in rural areas and since agriculture assets were not key to households' incomes in these areas, we simply subdivided the urban typology into two groups, distinguishing between households that do own livestock and households that do not.

In the rural areas we found that the rural Terai generally was distinct from the rural hills and mountains based on access, livestock and land importance and income composition. The rural hills and mountains are more isolated and less market integrated, households heavily depend on agriculture income and cash income is low. On the other hand, in the rural Terai although households remain heavily dependant on agriculture for their income, they do have better access to roads and markets and obtain a larger portion of their income from agriculture cash income. Within both the rural hills and mountains typology and the rural Terai typology, we further subdivide the households according to the agriculture assets owned, since these proved to be correlated with household income. The first group of households is landless and has no livestock (landless, no livestock). The second group does not own land but does own livestock (landless, with livestock). The third group owns between zero and one hectare of land and up to 2 TLU of livestock (marginal land, less than 2TLU). The fourth group owns between zero and one hectare of land and more than 2TLU of livestock (marginal, more than 2TLU). The fifth group owns more than one hectare of land (non-marginal land). The threshold values for the land and livestock holding of each sub-group were obtained by close investigation of the data and by trying to balance the number of households within each group.

each sub-group were obtained by close investigation of the data and by trying to balance the number of households within each group.

6.2 Total Household Income

Based on the household typologies elicited we now proceed to investigate how total household income varies according to the household typologies (See Table 6.2).

In the case of the urban typology we find that income is higher if households do not own livestock. This was expected and follows all the previous conclusions reached since households in the urban areas diversify income more and rely less on agriculture.

Table 6.2 *: Income by household typology*

Typology	Mean (NRs.)	Sd (NRs.)	HH Freq.	Share of sub-sample (%)
Urban Typology				
No livestock	125,234	198,135	521	74.9
With livestock	81,005	102,932	175	25.1
Total	114,113	179,983	696	100.0
Rural Terai Typology				
Landless, no livestock	17,226	32,417	93	8.5
Landless, with livestock	16,786	18,766	157	14.4
Marginal land, less than 2TLU	19,527	19,286	302	27.6
Marginal land, more than 2TLU	31,659	25,989	221	20.2
Non-marginal land	49,237	46,202	321	29.3
Total	30,107	34,359	1,094	100.0
Rural Hills & Mountains Typology				
Landless, no livestock	28,317	23,653	41	2.7
Landless, with livestock	27,880	25,369	34	2.2
Marginal land, less than 2TLU	24,506	26,194	451	29.3
Marginal land, more than 2TLU	29,728	32,294	634	41.2
Non-marginal land	43,898	55,687	378	24.6
Total	31,601	38,385	1,538	100.0

Source: NLSS (World Bank, 1996), calculations by the author.

In the case of the rural Terai typology we find that generally income increases with increasing land and livestock ownership. Households that do not own land or that own a little land and livestock are considerably worse off compared to the other two groups of the typology. Income doubles and triples respectively with respect to the landless groups for the households with marginal land and more that 2TLU and for the households with non-marginal land. The quantity of livestock owned and the land area owned in the rural Terai is strongly correlated with household income.

In the rural hills and mountains the landless households appear to be better off compared to the households with little land and livestock. But it must be noted that, for this typology, the landless groups are considerably small making the results somewhat unreliable. Income starts rising, compared to the landless households, once households own some land and more than 2TLU. Compared with the landless households, the non-marginal land households have an average income that is 1.5 times as high, compared to three times as high in the rural Terai.

Households that live in the rural Terai and do not have access to agriculture assets or only have small amounts are worse off compared to the rural hills and mountains and also make up for a larger portion of the typology sample. But when the level of agriculture assets surpasses the marginal land with more than 2TLU threshold, we find that the households in the rural Terai are better off on average.

6.3 Income Sources

We now turn to assessing how the households within each typology are generating income.

In the case of the urban typology, we find that households that do not own livestock as expected are generating most of their income from non-agriculture sources. Interestingly though, although a small share of income comes from agriculture, most of the farm income still comes from home production. On the other hand, in the case of livestock owners living in urban areas, the biggest income source is farm income, still strongly subsistence based, with comparatively less income coming from wages and enterprise income. For the livestock owners, livestock contributes significantly to farm cash income and livestock becomes a mean for the poorer households to increase their income (See Table 6.3).

In the case of the rural Terai, most of households' income comes from agriculture. As the amount of agricultural assets increases the contribution of agriculture to total household income increases and ranges from 15.7% to 80.2% of total household income. The contribution of subsistence agriculture to total farm income is generally very high, and its contribution to total income increases with the increasing amount of livestock and land owned. Furthermore the more land and livestock owned by the household, the more of household income is in the form of farm cash income, contributing up to 25.1% of total household income. Livestock contributes significantly to total household income, whereby the contribution increases with increasing herd size. Furthermore, livestock contributes to both home production and cash income, the portion of farm cash income from livestock being considerably high (See Table 6.4).

In the rural hills and mountains, with the exception of the asset-poor households, households generate most of their income from agriculture. Increasing amounts of land and livestock relate to an increasing portion of income coming from agriculture and ranging from a minimum of 9.5% to a maximum of 74.3% on average. As the amounts of land and livestock owned by households increase, the portion of farm cash income increases and represents, at a maximum, 13.8% of total household income for the group of non-marginal land households. Livestock contributes significantly to total household income, whereby the contribution increases with increasing herd size. Livestock home production contributes more to total household income compared to

livestock cash income. Nevertheless, the contribution of livestock to farm cash income is high, and important for this region since the access to cash income is low due to the remoteness of households in these areas (See Table 6.5).

Table 6.3 *: Income sources for the urban typology.*

Urban Typology														
	Total Income					Home Production		Farm Cash		Total Livestock	Livestock Home Production		Livestock Cash	
	Farm	Wage	Rent	Enterprise	Other	HP/TF	HP/ TOT	FC/TF	FC/ TOT	L/TOT	LHP/ HP	LHP/ TOT	LC/ FC	LC/ TOT
No livestock	3.9	34.8	21.6	31.0	8.7	95.5	3.4	4.5	0.5	0	0.7	0.1	0.0	0.0
Livestock	33.6	19.2	26.5	13.3	7.5	83.6	26.3	16.4	7.3	8.3	21.1	4.9	41.2	3.4
Total	11.4	30.9	22.8	26.5	8.4	89.2	9.1	10.8	2.2	2.1	11.4	1.3	32.7	0.9

Abbreviations:

HP: Farm home production income FC: Total farm cash income TF: Total farm income LHP: Livestock home production income

TOT: Total household income LC: Livestock cash income L: Livestock

Source: NLSS (World Bank, 1996), calculations by the author.

Table 6.4 *: Income sources for the rural Terai typology.*

Rural Terai Typology														
	Total Income					Home Production		Farm Cash		Total Livestock	Livestock Home Production		Livestock Cash	
	Farm	Wage	Rent	Enterprise	Other	HP/TF	HP/ TOT	FC/TF	FC/ TOT	L/TOT	LHP/ HP	LHP/ TOT	LC/FC	LC/ TOT
Landless, no livestock	15.7	24.2	12.7	34.4	13.1	94.3	15.2	5.7	0.5	0.0	4.2	0.2	66.7[12]	0.2
Landless, with livestock	39.1	22.9	10.4	14.4	13.2	78.5	29.6	21.5	9.4	11.4	16.8	4.8	65.6	6.6
Marginal land, less than 2 TLU	56.1	17.4	7.6	12.4	6.4	82.3	44.3	17.7	11.8	6.4	6.2	2.3	31.5	4.1
Marginal land, more than 2 TLU	73.2	6.7	6.2	6.2	7.6	81.2	58.1	18.8	15.1	13.0	12.8	6.6	40.6	6.4
Non-marginal land	80.2	5.8	6.4	4.6	3.0	71.1	55.1	28.9	25.1	8.0	7.4	4.0	20.4	4.0
Total	60.8	13.2	7.8	11.0	7.2	78.6	45.7	21.4	15.1	8.4	9.2	3.9	32.2	4.6

Abbreviations:

HP: Farm home production income FC: Total farm cash income TF: Total farm income LHP: Livestock home production income

TOT: Total household income LC: Livestock cash income L: Livestock

Source: NLSS (World Bank, 1996), calculations by the author.

[12] Livestock ownership may change throughout the year.

Table 6.5 *: Income sources for the Rural Hills and Mountains typology.*

Rural Hills and Mountains Typology														
	Total Income					Home Production		Farm Cash		Total Livestock	Livestock Home Production		Livestock Cash	
	Farm	Wage	Rent	Enterprise	Other	HP/TF	HP/ TOT	FC/TF	FC/ TOT	L/TOT	LHP/ HP	LHP/ TOT	LC/ FC	LC/ TOT
Landless, no livestock	9.5	33.7	3.2	44.4	9.1	99.9	9.5	0.1	0.0	0.0	2.0	0.1	0.0	0.0
Landless, with livestock	40.2	29.4	12.4	10.5	7.5	94.2	38.0	5.8	2.2	11.8	29.2	10.7	63.1	1.1
Marginal land, less than 2 TLU	57.2	11.1	12.6	7.4	11.7	90.9	51.3	9.1	5.8	7.7	9.7	4.8	42.6	2.9
Marginal land, more than 2 TLU	71.6	8.3	8.6	3.3	8.1	86.9	61.3	13.1	10.3	14.7	14.0	8.5	52.0	6.3
Non-marginal land	74.3	8.5	8.0	3.5	5.7	83.3	60.5	16.7	13.8	14.1	14.8	8.7	40.9	5.4
Total	65.7	10.3	9.6	5.8	8.6	87.5	56.3	12.5	9.4	12.1	13.1	7.3	46.4	4.8

Abbreviations:

HP: Farm home production income FC: Total farm cash income TF: Total farm income LHP: Livestock home production income

TOT: Total household income LC: Livestock cash income L: Livestock

Source: NLSS (World Bank, 1996), calculations by the author.

Comparing the rural Terai and the rural hills and mountains, generally we find that the contribution made by farm cash income to total household income is relatively higher in the rural Terai compared to the rural hills and mountains. This is as expected since market and road integration in the rural Terai is considerably better compared to the rural hills and mountains. But when the asset level reaches that of the non-marginal land group, the portion of total household income from livestock cash is found to be higher in the rural hills and mountains compared to the rural Terai.

6.4 Poverty and Inequality

According to the urban typology households, the sub-sample of households that owns livestock and lives in the urban areas presents a higher proportion of poor households. Poverty is also deeper and more severe in the case of households that own livestock, although income is found to be more evenly distributed (See Table 6.6).

In the case of the rural Terai, as households increase the amount of assets owned, the proportion of poor households decreases. Nevertheless the portion of households that live below the poverty line is very high and only starts decreasing for the non-marginal land group of households.

In the rural hills and mountains, the landless households seem to be relatively better off compared to the households with more agricultural assets. Nevertheless these results may not be extremely reliable due to the small sample size of these two groups. Generally the trend is that the proportion of poor households decreases as the amount of land and livestock owned increases.

The proportion of poor households in the rural areas is very high. Overall, households living in the rural Terai are worse off compared to households living in the rural hills and mountains. As households reach the level of assets according to which they are classified as non-marginal land households, the proportion of poor in the rural hills and mountains and the proportion of poor in the rural Terai converge to the same percentage.

Summary

We set up household typologies based on the level of agricultural assets owned by the households and on the location of the households distinguishing between urban, rural Terai and the rural hills and mountain areas. Generally we find that livestock is an important contributor to household cash income, especially so in the more isolated hills and mountain areas where access to market and cash income is very limited and for the landless households. Poverty levels for households with no access to agricultural assets are very high, especially in the rural Terai regions, and generally remain high in all the samples.

***Table 6.6** : Poverty and inequality measure by household typology.*

	Headcount	Poverty Gap	Severity	Gini Coefficient
Urban Typology				
No livestock	0.165	0.078	0.052	0.526
With livestock	0.320	0.139	0.089	0.486
Rural Terai Typology				
Landless, no livestock	0.787	0.532	0.422	0.642
Landless, with livestock	0.818	0.514	0.38	0.557
Marginal land, less than 2TLU	0.712	0.339	0.208	0.402
Marginal land, more than 2TLU	0.606	0.213	0.101	0.343
Non-marginal land	0.418	0.127	0.055	0.347
Rural Hills & Mountains Typology				
Landless, no livestock	0.371	0.209	0.151	0.486
Landless, with livestock	0.499	0.245	0.169	0.519
Marginal land, less than 2TLU	0.534	0.229	0.131	0.438
Marginal land, more than 2TLU	0.564	0.224	0.115	0.397
Non-marginal land	0.416	0.149	0.073	0.437

Source: NLSS (World Bank, 1996), calculations by the author.

7. MAIN FINDINGS AND CONCLUSIONS

Nepal is one of the poorest countries in the world. Land-locked amongst China and India with an estimated population of 23 million people, in 1998 Nepal reported a per capita GNP of $200 putting it along side some of the poorest countries in sub-Saharan Africa. Government insurgencies and instability in recent years have contrasted the slow economic growth process initiated at the start of the 1990s by the Nepalese government. Consequently Nepal witnessed a contraction in the economy in 2002 and a decline in the growth rate of the agriculture sector.

In this context, the aim of this study has been two-fold. First we analysed the data in order to gain a thorough understanding of the socio-economic characteristics, income sources (also related to livestock), poverty levels, and asset distribution amongst the poor households living in Nepal. Secondly, based on the findings from the first part of the analysis, we set up some livestock based household typologies to be used to identify household groups within the country and correctly target the impact of specific livestock policies.

When investigating the differences in household socio-demographic characteristics across the regions, we found little variation with the exception of literacy rates. We find that, on average, households comprise 6 individuals and have 2.5 children per household. Literacy rates are low, few households are female headed and there is little variation in the average age of the household heads across the sample sub-divisions. Remoteness of some areas of Nepal remains dramatically apparent. The mountains and rural hills are the areas that mostly suffer from isolation and for which connection to facilities, including roads, markets and primary schools, is particularly difficult. The rural Terai is much better connected to the facilities indicated and, in this, is more similar to the urban areas.

Land and livestock ownership is found to be a common feature amongst the Nepalese households. We find that most households in the rural areas own land, more so in the mountains and in the rural hills. Land ownership is slightly less in the rural Terai but the average land plot in this region is larger compared to the rural hills and mountains. Almost all households in the rural areas own livestock and the largest average household herd sizes are found in the mountains and rural hills. Almost all households own large ruminants, and, to slightly smaller extent, small ruminants and poultry. Pig ownership is not very widespread.

There is a very large variation in total household income between the rural and urban areas, where income in the rural areas is approximately 27% of total household income in the urban areas. In the rural areas the largest share of income comes from agriculture, whereas urban households diversify their income generation sources more and generate most of their income from wage, rent and enterprise income.

Poverty in the rural areas is endemic and household income poverty levels in the rural areas are much higher compared to the urban areas. The proportion of poor households amongst the livestock owners is higher than amongst the non-livestock owners (this is also true since most of the rural households own livestock), nevertheless poverty is less severe compared to the non-livestock owners households.

In the analysis of farm income we distinguish between subsistence agriculture income and farm cash income, and we assess the contribution of livestock to household income. We find that generally in the rural areas most of household income comes from subsistence farming, especially in the more isolated mountain and rural hills areas. In the rural Terai, the share of subsistence agriculture decreases compared to the rural hills and mountains and the proportion of total household income from agriculture cash income increases, but still remains one of the major contributors. Generally the contribution of livestock to household income is higher in the mountains and rural hills compared to the rural Terai. In the rural areas, livestock is found to be

an important contributor to the influx of cash income for the rural households. Overall dairy home production contributes more to total household income compared to meat home production income.

By looking at the asset distribution in the three rural areas and in the urban areas across income terciles, we find that within the rural areas agriculture assets are correlated with higher income levels. This is especially the case in the rural Terai. Regarding the rural areas, we conclude that the conditions in the rural hills and mountains are similar, while the rural Terai remains a more separate case. Households' asset distribution patterns in the urban areas are considerably different, although land ownership is still found to be an important asset.

From the initial part of the analysis we conclude that there is a large divide between the conditions in the urban areas of the country and in the rural areas and that poverty is prevalently a rural phenomenon in the case of Nepal. Furthermore within the rural areas, we conclude that the more isolated rural hills and the mountains have similar characteristics, while the rural Terai remains a more separate case and that agricultural asset ownership, including livestock ownership, plays an important role in the context of rural livelihoods.

Based on these finding, we establish three main criteria for the household typologies, namely location, land ownership and livestock ownership. Based on these three criteria we proceed to set-up three typology groups: urban households (2 sub-groups), rural Terai (5 sub-groups) and mountains and rural hills (5 sub-groups, the same as in the case of the rural Terai), thus generating a total of 12 typologies.

Generally we find that in the rural areas ownership of an increasing amount of land and livestock by the households is correlated with higher household income. In the rural Terai landless households are found to be considerably worse off compared with households in the rural hills and mountains, although the landless samples in the rural hills and mountains is considerably small. Once the amount of agriculture assets owned increases above the levels of up to 1 ha of land and less than 2 TLU of livestock, households in the rural Terai are found to have higher average incomes compared to households in the rural hills and mountains. In the urban areas, although farm income is not the largest source of income, farming is still mostly subsistence based. Generally in the rural areas poverty levels are very high.

Livestock contributes significantly to total household income, both to subsistence farming income and to farm cash income. We find that the proportion of farm cash income that comes from livestock is very high, considerably so for the landless groups. Comparing the rural Terai and the rural hills and mountains, generally we find that the contribution made by farm cash income to total household income is relatively higher in the rural Terai compared to the rural hills and mountains. This is as expected since market and road integration in the rural Terai is considerably better compared to the rural hills and mountains. But when the asset level reaches that of the non-marginal land group, the portion of total household income from livestock cash is found to be higher in the rural hills and mountains compared to the rural Terai.

Conclusions

- Poverty in Nepal is mainly a rural phenomenon, where households mostly own land and livestock, are more likely to have an illiterate household head and earn less that one third of the income earned in the urban areas. Therefore by targeting livestock with the assistance of livestock policies, rural households will be affected.
- Agriculture plays a key role in the livelihoods of the rural areas and is the main source of income for the rural households. Agriculture remains mostly subsistence oriented, whereby farm home production income is the largest contributor to

household total income. In the rural areas, livestock contributes significantly to household income. This is a strong call for policy makers to ensure that policies aimed at improving productivity and return to agricultural assets are put in place, since this will indirectly target the large portion of rural poor in the country.

- Access to cash income is limited in the rural areas, more so in the mountains and rural hills that are extremely isolated. Livestock is found to be an important contributor to farm cash income, even in the rural hills and mountains where access to cash is very restricted. Policies directed at improving access to market with a focus on the livestock sector and livestock products could assist in increasing the amount of cash return to the rural households.
- Livestock seems to be one of the few options for landless rural households to earn some cash income.

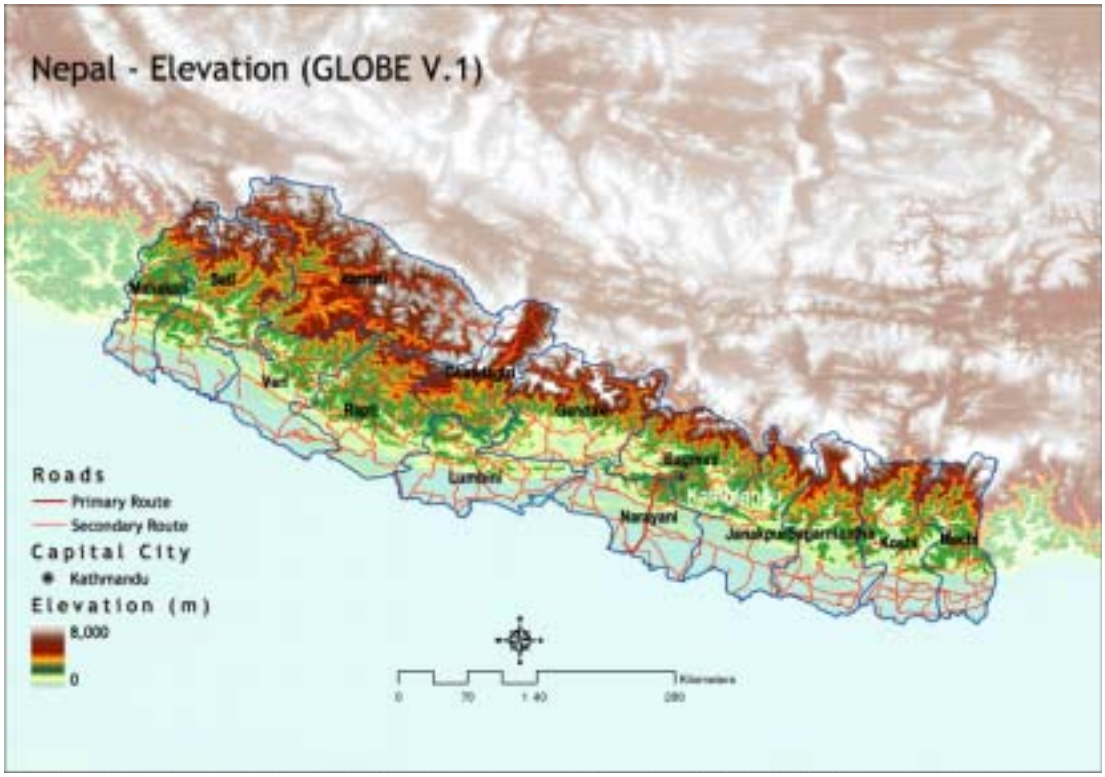
8. ANNEX I: INCOME COMPONENTS

Source	Detail	Description
Farming and Livestock	Crops	Revenues minus expenditures
	Livestock	Animal sale minus animals bought plus animal production
	Agriculture Assets	Agriculture assets sale minus agriculture assets bought
	Home Production	Home production consumed within the household
Wage	Non-Agriculture	Wage income received for non-agriculture activities
	Agriculture	Wage income received for agriculture activities
Rent	Agriculture Land	Land rented out during dry season
		Land rented out during wet season
		Rent paid for land
	Non-Agriculture Rent	Non-agriculture property (non included in 12,13 or dwelling)
		Other non-agriculture assets
	Housing	Rent equivalent that would have been paid
		Rent paid
Non-farm	Non-farm enterprise	Revenues minus expenditures
Other	Transfers	Transfers out of household
	Remittances	Income from remittances
	Dividends	Income from saving dividends etc.

9. ANNEX II: MAPS

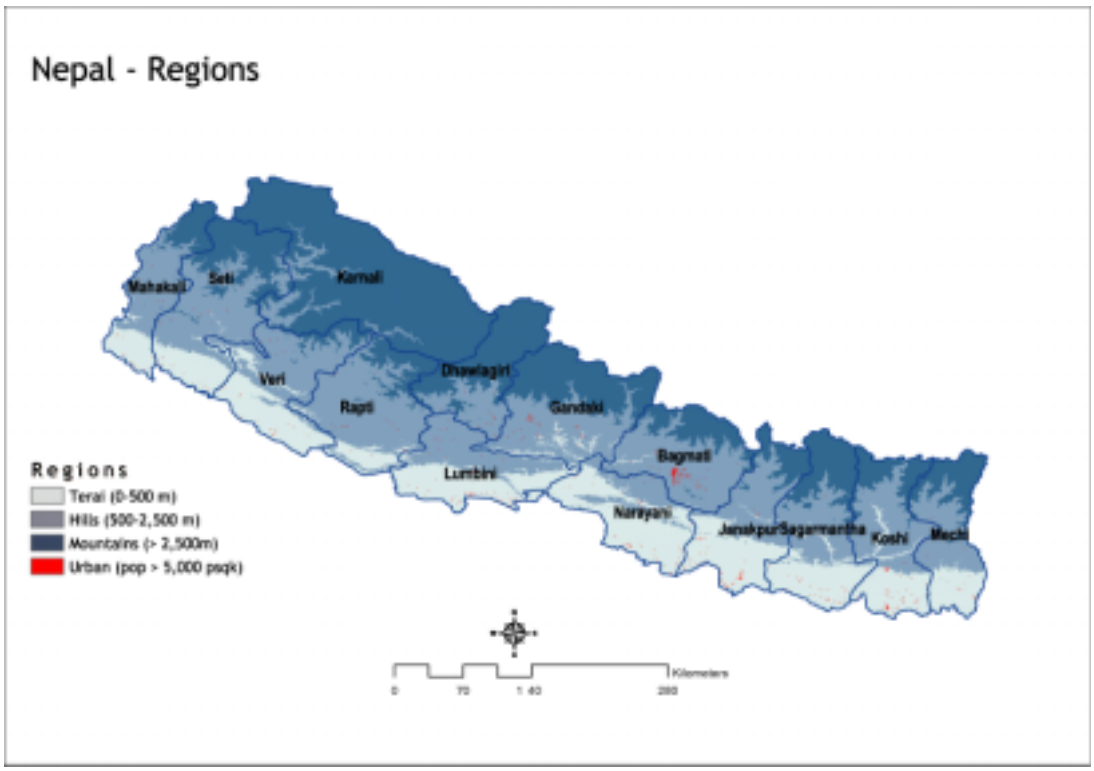
Figure 9.3 : *Map of Nepal*

Figure 9.4 *: Topography in Nepal*



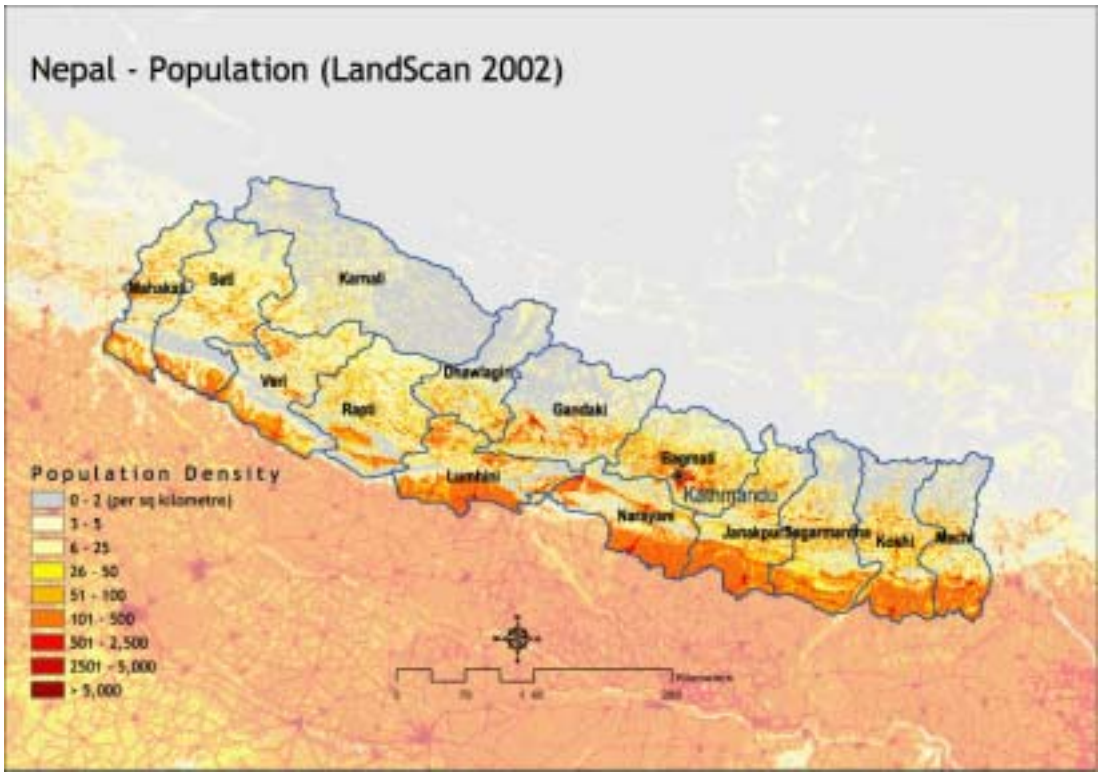
Source: GLOBE Version 1 (http://www.ngdc.noaa.gov/seg/topo/globe.shtml).

Figure 9.3 *: Agro-Ecological Zones in Nepal*



Source: FAO (2003) – derived from a combination of human population density (LandScan 2002) and elevation (GLOBE V.1.)

***Figure 9.4** : Population distribution in Nepal*



Source: LandScan (2002) (http://www.ornl.gov/sci/gist/landscan)

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