Chapter 2

Rural Environment, Poverty, and Livelihood

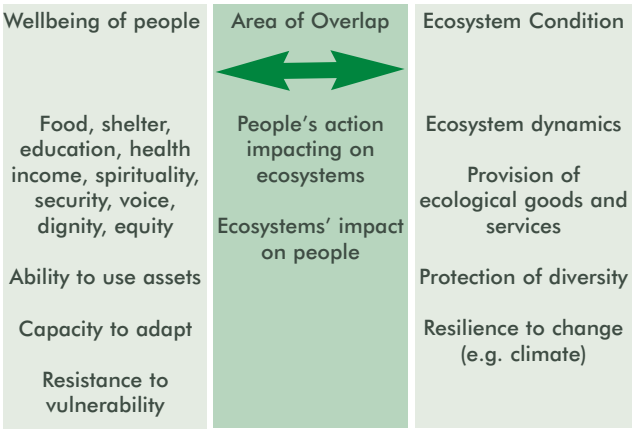
Introduction

"Rural environment" refers to human settlements in rural settings, their surroundings, and their interrelationships. It includes both natural and human-made or cultural environments. The natural environment comprises water, air, soil, forests, pasture, wildlife, and so on, while the cultural environment includes settlements and their patterns, transportation, technology, utilities, services and others. In Nepal, the Ministry of Local Development defines rural and urban localities. Population size is the principal criterion for this designation, but the threshold size of population has changed since the census year of 1952/1954[1]. The present threshold population size for designating municipalities was set in 1996 at 20,000 for the Terai and 10,000 for the Hill and Mountain regions. All settlements with populations below these figures are defined as rural localities.

Rural environments in Nepal vary considerably with variations in altitude. Over the country, elevations range from 90 to 8,848 meters above sea level (masl). For socio-economic purposes, the 75 administrative districts are identified as belonging to one of three regions: the Terai (the mostly low lying area along the southern border), Hills, and Mountains. These regions have significant differences in topography, natural endowments, economic activities, and human occupancy with corresponding implications for biodiversity and development activities.

Rapid population growth, increasing density of settlements, degradation of land, loss of biodiversity, shortage of water, and changing weather events have affected food, health, incomes, and the environmental security of rural people. Livelihoods in rural areas, particularly in the hills and mountains, have been supported by a complex web of dynamic interactions among the physical, cultural, and economic environments. A disruption in any one component can disturb the delicate balance and threaten the livelihood security of rural households.

Figure 2.1: People and Conservation Improving Livelihood and Ecosystems



Source: IUCN Nepal (2002)

Neither nature nor the cultural environment is a static entity—they change continually. However, the present rapid pace of change is very disruptive in rural areas. In areas with improved access, traditional farming systems are quickly moving towards commercial farming, based more and more on external market factors. Where access is poor and difficult and resource degradation has continued, livelihood conditions have actually worsened.

This chapter discusses population growth, settlements, services, and poverty and livelihood in the context of rural Nepal.

Rural Population

Growth and Distribution

Nepal is a rural nation, with over 86% of its 23 million people living in rural areas (as of 2001, Table 2.1). The rural population is one of the fundamental driving forces influencing the environmental resource base of the country. During the last five decades (1952–2001), both the total population and

[1] Two Nepali years, approximately mid April 1952 to mid April 1954

Table 2.1: Population Growth Rates[a]

Census Year	Total Population	Annual National Growth Rate (%)	Rural Population	% of total	Annual Rural Growth Rate (%)
1952/1954[b]	8,256,625		8,018,350	97.11	
1961	9,412,996	1.7	9,076,774	96.43	1.2
1971	11,555,983	2.1	11,094,045	96.00	2.0
1981	15,022,839	2.6	14,066,118	93.63	2.4
1991	18,491,097	2.1	16,795,378	90.83	1.8
2001	23,151,423	2.3	19,922,311	86.05	1.7

[a]Growth rates of population are obtained from the following equation: $r = \frac{\log e\left(\frac{p2}{p1}\right)}{t}$

[b]Census of 1952/54 covered two Nepali years, approximately mid April 1952 to mid April 1954
Source: CBS (2003) pp. 37–85.

Table 2.2: Distribution, Density, and Growth of Rural Population by Region

Region	Rural Area (km^2)	Rural Population Change 1991–2001				% of Total Population 1991	% of Total Population 2001	Rural Density per km^2 2001
		1991	2001	% Increase	Growth Rate			
Mountain	51,661	1,405,113	1,644,154	17.0	1.6	8.7	8.3	32
Hill	59,955	7,289,308	8,567,672	17.5	1.6	45.0	43.0	143
Terai	32,289	8,100,957	9,710,485	19.9	2.6	46.3	48.7	301
Country	143,905	16,795,378	19,922,311	18.6	1.7	90.8	86.1	138

km^2 = square kilometer
Source: CBS (2003) pp. 37–85.

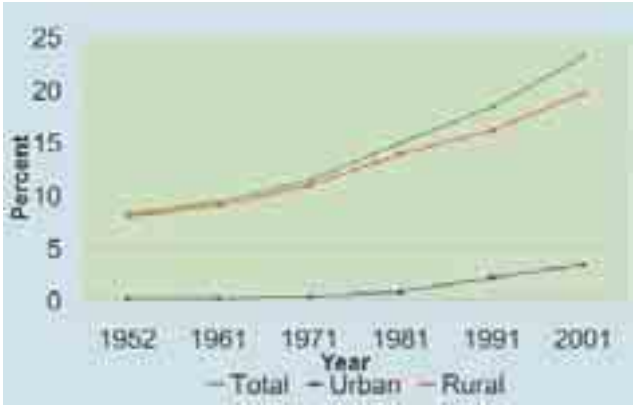
the rural population have increased enormously. In 1952, the country's total population was 8.26 million, with a rural population of 8 million that increased to 20 million by 2001 (Table 2.1). However, the country's annual population growth rates have always exceeded the annual rural population growth rates (Table 2.1; Fig. 2.2). It is estimated that the population will reach 29 million by 2011 (CBS 2003).

Since 1981, national and rural population growth rates have been rapid, putting tremendous pressure on natural resources such as agricultural land and forests. At present, the population density of the country as a whole is 157 persons per square kilometer (km^2). The density on agricultural land is 570 persons per km^2.

Owing to variations in topography, natural resources, cultures, and infrastructure facilities, the Mountain, Hill, and Terai regions exhibit marked variations in the growth and distribution of rural population (Table 2.2). The rural population increased in all three regions between 1991 and 2001, but the growth of rural population in Mountain and Hill areas (17%), was less than in the Terai (29%). The growth rate of rural population in the Terai was 2.6% per year, higher than the growth rate in the two other regions. In both the Mountain and the Hill regions, the growth rate of rural population was less than the growth rate of the national rural population (2.1%).

According to the 2001 census, the Terai—which has the smallest area—has the largest share of rural population with 49%, followed by the Hill (43%) and the Mountain regions (8%). Comparing the relative share of rural population in the regions between the census years 1991 and 2001, the Mountain and Hill regions have shown a decreasing trend and the Terai an increasing trend. As a result, the density of rural

Figure 2.2: National, Rural, and Urban Population Growth Rates, Nepal



Source: CBS (2003)

population in the Terai with 301 persons per km^2 is the highest in the country.

With the lowest density and growth rate of population, the Mountain region has less pressure on its natural resources than the other two regions. For example, the per capita cultivated landholding in the Mountain region is 0.31 hectares (ha) compared with 0.16 and 0.17 ha in the Hill and the Terai regions, respectively (Table 2.3). Likewise, the Terai region has the lowest per capita forest land (0.11 ha), while the Mountain region has the largest per capita forest land. In other words, the Terai has the greatest pressure on both its cultivated and forest resources.

Economic Characteristics

The economically active population above 10 years of age constitutes 45% of the nation as a whole. Of the total rural population, 48% are economically active, compared with 41% in urban areas. In all cases, however, the proportions of economically active population are below 50%, which means that there is a large dependent population.

According to the 2001 census, 66% of the total gainfully employed population is engaged in the primary sector including agriculture, forestry, and fishery. This figure was 81% in 1991. There was a significant increase in employment in the manufacturing (secondary) and commerce (tertiary) sectors between 1991 and 2001. In rural areas, the primary sector employed 72% of the total gainfully employed population as against 42% in urban areas. About 10% and 17% of the rural gainfully employed population are engaged in the secondary and tertiary sectors, as against 18% and 40% in urban areas. The share of the primary sector in the Mountain region is 81%, compared with 68% and 60% in the Hill and Terai regions, respectively. Other important employment sectors in the Hill and Terai regions are commerce, manufacturing, and personal and community services.

Social Characteristics

In the last census in 2001, the literacy rate of the country's total rural population 6 years of age and above (16,428,183) was 52% (Table 2.4), compared with the national literacy rate of 54% (CBS 2002b). The rural literacy rate is higher in the Hill region (58%) than in the Terai (48%) or the Mountains (48%).

The rural sex ratio is 99.8 males per 100 females. The Terai region as a whole has a ratio of 103.8, whereas the Mountain and the Hill regions have ratios of 98.4 and 95.8, respectively. The sex ratio is lowest in the western development region at 93.

The dependent population below 15 and above 59 years of age accounts for 53% of the total rural population. The total fertility rate among women aged 15–49 years is 4.4, which is double the rate of urban women (2.1); the under-five mortality rate in rural areas is 112 per thousand live births vs. 66 in urban areas; contraceptive prevalence in rural areas is 47% among women of reproductive age (15–49) compared with 66% for urban areas; and infant

Table 2.3: Cultivated and Forest Land by Region, Nepal, 2001

Region	Total Area (km^2)	Number of Districts	Per Capita Cultivated Land (ha)[a]	Per Capita Forest Land (ha)[a]
Mountain	51,817	16	0.31	0.70
Hill	61,345	39	0.16	0.30
Terai	34,019	20	0.17	0.11
Country	**147,181**	**75**	**0.18**	**0.24**

ha = hectare; km^2 = square kilometer
[a] No separate data on cultivated land and forest land available at rural level .
Source: JAFTA (2001)

Table 2.4: Literacy Status of the Rural Population (6 years of age and above) [a]

Literacy Category	Mountain		Hill		Terai		Rural Total	
	Number	%	Number	%	Number	%	Number	%
Can't read or write	625,184	51.0	2,965,111	41.9	4,139,386	51.0	7,729,681	47.1
Read only	82,876	6.8	487,617	6.9	487,632	6.0	1,058,125	6.4
Read and write	507,618	41.4	3,588,820	50.7	3,441,026	42.4	7,537,464	45.9
Not stated	10,277	0.8	40,215	0.5	52,421	0.6	102,913	0.6
Total	**1,225,955**	**100.0**	**7,081,763**	**100.0**	**8,120,465**	**100.0**	**16,428,183**	**100.0**

[a]Rural literacy for a district is obtained by subtracting the urban literate population from the total literate population.
Source: CBS (2002b)

mortality rates for rural and urban areas are 79 and 50 per thousand live births, respectively. The data shown in Table 2.5 indicate some of the human development measures and basic facilities in rural and urban areas. Selected measures of human development—including gross domestic product (GDP) per capita, human development index, education index, life expectancy index, gender related indices and human poverty index—show that the performance of rural areas is much poorer than that of urban areas. Similarly, there are marked differences regarding basic facilities such as piped drinking water, sanitation, electricity, fuel used, and mass media exposure. In most cases, the facilities for households in rural areas are fewer than in urban areas. The Nepal Living Standards Survey (NLSS) 2004 (NLSS 2004) indicates that a majority of households consider their access to public services such as health, education, drinking water, electricity, road, post office and telephone as "fair", whereas "bad" ratings range from 15% (education and post office) to 44% (road).

The population of Nepal includes diverse ethnic groups and castes, languages, religions, and cultural traditions. In the Hill and Terai regions, Janjatis populations (ethnic groups) account for 36.5% of the total population and Hindu castes for nearly 59%. Unlike urban areas, the population of rural localities in all regions is characterized by more or less homogenous ethnicity and caste. However, the population of the emerging rural towns and market centers is more diverse.

Migration

Movement of people from one place to another for economic, social, cultural, and other reasons has a long tradition in Nepal. Migration of hill populations increased after the 1950s following the control of endemic malaria in the Terai region and the warm river valleys.

Table 2.5: Performance of Rural and Urban Areas Regarding Basic Facilities and Development , 2001

	Description	Rural	Urban
Demographic Features	Total fertility rate (women aged 15–49)	4.4	2.1
	Current use of contraception (any method)	46.8	66.0
	Childhood mortality (per 1,000 live births)		
	Infant	79.3	50.1
	Child	35.4	16.7
	Under five	111.9	65.9
Human Development Measures	GDP per capita (PPP) $ (2000)	1,094	2,133
	Human development index (2000)	0.446	0.616
	Education index (2000)	0.276	0.568
	Life expectancy index (2000)	0.562	0.769
	Gender related development index (2000)	0.426	0.605
	Gender empowerment measure	0.333	0.443
	Human poverty index (2000)	41.4	23.9
	Malnourishment among children under 5 years (%)	56.3	36.1
Basic Facilities	Piped drinking water (% households)	33.0	55.2
	Sanitation facilities (% households)		
	Flush toilet	6.1	58.3
	Pit toilet	17.1	14.6
	No facility	75.3	20.1
	Other	1.5	7.0
	Electricity connection (% households)	17.4	85.7
	Fuel used (% households)		
	Firewood	94.1	39.1
	Kerosene	2.3	35.8
	Other	3.6	25.1
	Exposure to mass media, newspaper, radio and TV (% hh)	10.3	40.6

hh = households, GDP = gross domestic product, PPP = purchasing power parity, TV = television
Source: CBS (2003) p. 409.

Table 2.6 shows that by 2001, 1.73 million people (or 7.5% of the total population) had migrated to a region different to that of their original birthplace. The Terai region has been the preferred destination for migrants, receiving 77% of the total. The Hill region is the largest source of out-migration with 69% of the total. In terms of net migration, both the Mountain and the Hill regions are losing population, whereas the Terai is gaining. Census reports indicate that the Terai has been a receiving area for migrants for the last three decades. The NLSS (2004) indicates that the migration rate is higher for females (50%) than males (22%).

In terms of rural and urban areas, rural to rural migration was highest, with 68% of total migrants; rural-urban migration second with 26%; and urban to urban migration lowest with 3% (Table 2.7). NLSS (2004) indicates that the rural origin of migration is the largest with 82%, followed by external (13%) and urban origin (6%).

Migration in Nepal is mainly due to family reasons such as marriage and dependency, which accounted for 75% of all migrants (NLSS 2004). Other reasons include easier lifestyle (12%), looking for job (7%), education and/or training (2.6%), and others. This pattern is true across the three regions and rural and urban areas. However, in rural areas, family reasons accounted for 80% of migration compared with 54% in urban areas. Second in rural areas was easier lifestyle (11%), whereas that in urban areas was looking for job (18%).

The volume of migrations with a duration of more than 10 years is 44% (CBS 2003). The share of the Terai region for migrants staying over 10 years is 50%, compared with 37% and 35% in the Mountain and the Hill regions, respectively. For the country as a whole, the distribution of migrants for different classes of duration of stay (6–10 years, 1–5 years, and less than 1 year) is 23%, 28%, and 5%, respectively.

Nepal's population growth is rapid, which is directly and indirectly related to major environmental resources such as agricultural land, forest, and water on which the majority of the population depends for livelihood. Rapid population growth coupled with the manner in which these resources have been used has placed considerable stress on the environment and has in many cases led to accelerated deterioration of both local and regional environments such as deforestation; soil erosion; floods; desertification; degradation of soil quality; and destruction of hydrodams, irrigation canals, and roads.

Rural Settlement

Definition

Officially, the rural population of Nepal refers to those residing in localities lying within the designated village development committee (VDC) areas (HMG 1999). The definition of a VDC as "rural" is purely administrative. The VDCs contain all settlements with populations below the threshhold for designation as a municipality (see Introduction). A VDC contains government offices and development activities to serve the inhabitants. A VDC generally contains more than one settlement locality.

Table 2.6: Migration of Population, Nepal, 2001 [a]

Origin	Destination				% Out-migration	Net Migration
	Mountain	Hill	Terai	Total		
Mountain		125,597	169,825	295,422	17.1	(255,103)
Hill	33,895		1,157,035	1,190,930	68.9	(830,759)
Terai	6,424	234,574		240,998	14.0	1,085,862
Total	**40,319**	**360,171**	**1,326,860**	**1,727,350**	**100.0**	
% Immigration	2.3	20.9	76.8	100.0		

[a] This figure does not include the movement of people within a region.
Source: CBS (2003) p. 134.

Table 2.7: Rural and Urban Migration by Region, 2001

Region	Rural–Rural		Urban–Rural		Rural–Urban		Urban–Urban		Total
	Number	%	Number	%	Number	%	Number	%	
Mountain	42,364	89.0	2,884	6.1	2,150	4.5	188	0.4	47,586
Hill	565,527	51.6	44,851	4.1	424,801	38.8	60,031	5.5	1,095,210
Terai	1,389,956	77.8	55,770	3.1	319,334	17.9	21,206	1.2	1,786,266
Total	**1,997,847**	**68.2**	**103,505**	**3.5**	**746,285**	**25.5**	**81,425**	**2.8**	**2,929,062**

Source: CBS (2003) p. 142.

B. Pradhan

Agglomeration village in the central hills of Nepal

B. Pradhan

Dispersed settlement type village in the central hills of Nepal

Morphological Features

Rural settlements are primarily of two forms: scattered and agglomerated. Scattered settlements are usually small, with large distances between buildings within the locality, as well as between the settlement localities. Agglomerated settlements, on the other hand, are usually large because they contain buildings that are relatively closely spaced or sometimes attached to each other. The density of buildings in agglomerated settlements is usually high. Market towns in rural areas are usually compact, with buildings commonly attached to each other. The rural settlement study carried out by the Central Department of Geography (CDG 2004) indicates that dispersed settlements are found widely across the Hill region. However, in the western Hills some of the settlements inhabited by the Gurung and Magar ethnic groups are of agglomerated form. The rural settlements in the Terai and the Mountain regions are mostly agglomerated or compact. However, the size of agglomerated settlements in the Mountain region is smaller than those in the Terai. In some parts of the eastern Mountain region, rural settlements are mostly in the scattered form.

These settlement forms are chiefly related to the amount and type of available resources, ruggedness of the topography, climatic conditions, amount of infrastructure services, and so on. Dispersed settlements in the Hills are chiefly the result of limited and scattered production resources and habitable environments in the rugged topography. The compact or agglomerated settlements in the Terai result from the abundant land resources and flat topography, while those of the Mountains are due to cold climate and social reasons. Because of poor sanitation and drainage, the environment of compact settlements is mostly unhealthy.

Distribution Pattern

Table 2.8 shows the distribution of settlement localities as reported by the 2001 census. Details of the number of localities by population size class and region, and their total population, for 1991 and 2001 are shown in Tables 2.9 and 2.10, respectively. All rural localities lie below the population size class 20,000–49,999. However, settlement localities in the population size class 10,000–19,999 also contain some designated urban areas, since in Hill and

Table 2.8: Distribution of Settlement Localities , 1991 and 2001

Population Size Class	Mountain		Hill		Terai		Country Total	
	1991	2001	1991	2001	1991	2001	1991	2001
Below 1,000	60	55	12	15	0	0	72	70
1,000–4,999	459	399	1,722	1,477	842	520	3,023	2,396
5,000–9,999	25	73	304	433	432	561	761	1,067
10,000–19,999	0	27	28	53	137	205	165	285
20,000–49,999	0	2	2	18	14	35	16	55
50,000–99,999	0	0	3	3	5	8	8	11
Over 99,999	0	0	2	3	1	2	3	5
Total	**544**	**556**	**2,073**	**2,002**	**1,431**	**1,331**	**4,048**	**3,889**
% Country total	13.4	14.3	51.2	51.5	35.4	34.2	100	100

Source: CBS (2002b)

Mountain districts, urban areas are defined as settlements with a population of 10,000 and over. The total number of settlement localities of this size in 2001 was 285, which included 277 rural and 8 designated urban areas. There were 16 settlement localities in the population size class 20,000–49,999 in 1991 compared with 55 in 2001, of which the number of rural localities was 11 and 21, respectively. The total number of rural areas decreased from 4,015 to 3,831 between 1991 and 2001, while the number of designated urban areas increased from 33 to 58. In 2001, all 544 rural localities in the Mountains were below a population size of 19,999 except for two designated urban areas. The total number of rural areas in the Hills was 1,976 as compared with 1,301 in the Terai. However, the average population size per rural locality is larger in the Terai (7,464) than in the Hills (4,336). The Mountains have the lowest population size per rural locality. The average population size of rural locality for the country as a whole is 5,200.

Increase in population has a direct bearing on the use of environmental resources, and increased demand for these resources causes their further degradation. The rural population and amount of agricultural land are both expanding, but the forest area is diminishing. Diminishing forest area means declining availability of forest products or increasing travel to collect forest products, which eventually affects the sustainability of agricultural production. In the Hills some of the sloping areas have been encroached for cultivation, resulting in landslides,

Table 2.9: Distribution of Settlement Localities and their Population by Region, 1991

Population Size Class	Mountain		Hill		Terai		Total	
	No. of Localities	Population	No. of Localities	Population	No. of Localities	Population	No. of Localities	Population
Below 500	16	5,680					16	5,680
500–999	44	34,028	12	10,290			56	44,318
1,000–1,999	123	192,527	222	374,896	20	35,422	365	602,845
2,000–2,999	168	420,467	595	1,506,155	201	528,968	964	2,455,590
3,000–3,999	115	398,017	561	1,947,370	357	1,248,667	1,033	3,594,054
4,000–4,999	53	237,131	244	359,901	137	1,177,904	661	2,943,691
5,000–9,999	25	155,280	304	1,901,280	432	3,014,438	761	5,070,998
10,000–19,999			28	359,901	137	1,755,500	165	2,115,401
20,000–49,999			2	43,691	14	430,899	16	474,590
50,000–99,999			3	210,527	5	306,892	8	517,419
Over 99,999			2	537,123	1	129,388	3	666,511
Country Total	**544**	**1,443,130**	**2,073**	**8,419,889**	**1,431**	**8,628,078**	**4,048**	**18,491,097**

Source: CBS (2002b)

Table 2.10: Distribution of Settlement Localities and their Population by Region, 2001

Population Size Class	Mountain		Hill		Terai		Total	
	No. of Localities	Population	No. of Localities	Population	No. of Localities	Population	No. of Localities	Population
Below 1,000	55	30,102	15	11,672	0	0	70	41,775
1,000–4,999	399	928,754	1,477	4,976,439	520	2,173,043	2,396	8,066,629
5,000–9,999	73	378,986	433	2,846,041	561	4,133,218	1,067	7,342,730
10,000–19,999	27	314,726	53	704,562	205	2,962,979	285	3,975,237
20,000–29,999	2	35,290	12	282,037	24	590,434	38	907,761
30,000–39,999	0	0	2	65,328	7	254,495	9	319,823
40,000–49,999	0	0	4	174,175	4	190,352	8	364,527
50,000–99,999	0	0	3	199,707	8	628,775	11	828,482
100,000–99,999	0	0	2	319,303	2	279,158	4	621,007
Over 299,999	0	0	1	671,846	0	0	1	683,452
Country Total	**556**	**1,687,859**	**2,002**	**10,251,111**	**1,331**	**11,212,453**	**3,889**	**23,151,423**

Source: CBS (2002b)

soil erosion, and depletion of water sources, further degrading the agricultural land. Declining forest cover causes frequent river floods and siltation, which also degrade agricultural land in the Terai.

Systems of rural settlement have environmental planning implications. Large villages are more flexible than small villages in terms of using environmental resources. Distance is unquestionably the most important constraint in using natural resources. Spatial proximity of villages to these production support facilities is a basic element of their effective use and hence efficiency in agricultural production (Pradhan 2004). Rural settlements in the Terai are usually bigger than those in the Hills. The scattered settlements of the Hills are neither viable for sustainable use of facilities related to the development of environmental resources nor feasible for providing consolidated force to communal development. While the Terai's agglomerated villages allow a considerable degree of flexibility in the provision of facilities, they may also invite overcrowding and environmental problems such as poor drainage and sanitation. Villages along the riverbanks in the Terai are very vulnerable to floods.

Rural Infrastructure and Services

Infrastructure and services related to the rural environment include roads, electricity, irrigation, health, and education. Data on these infrastructures and services are available at district level; their accessibility is analyzed in terms of trend, distribution, and density.

Roads

Roads are a basic infrastructure for development in Nepal, they include all types of roads: bitumen, gravel, and earthen. The total road length in 2002 was 16,835 km compared with 13,400 km in 1998 and 6,000 km in 1985. The Terai region has slightly over 50% of the total road length. Its density of 25 km road per 100 km^2 area is more than double the country average (Table 2.11). The Mountain region has a mere 1.4 km road per 100 km^2 area.

The total rural area of Nepal is 143,905 km^2 and the urban area is 3,276—98% and 2% of the total area of the country. The rural road density is 10.2 km road per 100 km^2 area, which is almost seven times less than the urban road density. The Terai region has the largest rural road density with 22.7 km per 100 km^2. Many parts of the rural Hill and Mountain regions are not accessible by road.

At present, the road network has connected 61 of 75 district headquarters. The effort to connect the remainder of the district headquarters by roads has been slow because of limited resources. Road construction in Hill and Mountain districts requires huge investment in both construction and maintenance. Although roads can be advocated on social grounds, this sector has yielded low economic returns and suffers from low traffic volume and lack of an integrated development approach.

Though roads have provided beneficial impacts on social and economic environments, these benefits have been accompanied by a number of adverse environmental impacts such as landslides, slope instability, soil erosion, and roadside runoff. While the negative environmental impacts of roads have often been the result of using construction techniques that are incompatible with naturally dynamic and fragile slopes, there have also been many cases of simple mitigation measures being employed (DOR 2000). "Green roads" based on bio-engineering principles and techniques (use of living plants and plant-derived materials in conjunction with inert structures for preventing failure of roadside steep slopes, limiting erosion and gullies, controlling runoff, and so on) that are practical, durable, economical, and environmentally sensitive (Schaffner 1987; DFID 1998; CDG 2001) should be adopted in Nepal.

Electricity

Table 2.12 shows the distribution of electricity connections to households. Less than 40% of households overall have electricity. The Hill region has electricity connections in nearly 43% of households; whereas nearly 80% of Mountain households do not have electricity. In 2001, electricity

Table: 2.11: Road Density by Region, Rural Area and Urban Area

Region	All Roads (km)		Rural Roads (km)		Urban Roads (km)	
	Length	per 100 km^2	Length	100 km^2	Length	100 km^2
Mountain	740	1.4	725	1.4	15	9.6
Hill	7,588	12.4	6,591	11.0	997	71.7
Terai	8,507	25.0	7,321	22.7	1,186	68.5
Total	**16,835**	**11.4**	**14,637**	**10.2**	**2,198**	**67.1**

km = kilometer , km^2 = square kilometer
Source: DOR (2002)

was provided to 17% of rural households compared with 86% in urban areas (CBS 2002b), though a recent survey has shown improving electricity connections in both rural (27%) and urban (87%) areas (NLSS 2004). The national rate of service increased from 14% in 1995/96 to 40% in 2001. Most rural households use other sources of energy such as fuelwood and kerosene for lighting and cooking.

Bhaktapur (Hill district in the central region) has the largest percentage of electricity connected households with 97.4% and Dolpa (Mountain district in the mid-west region) has the lowest with a mere 0.59% of households.

The current production capacity of 527.5 megawatts is a mere 0.63% of the total theoretical hydroelectricity potential of 83,000 megawatts and 1.26% of the economically feasible potential of 42,000 megawatts. In order to increase the access of electricity and to increase production in agriculture and other activities, the current Tenth Plan (2002–2007) has set several targets: (a) to construct 842 megawatts of electricity capacity, (b) 2,600 village development committees to be supplied with electricity through the national grid on the basis of equitable distribution, and (c) annual per capita electricity consumption to be raised to 100 kilowatt-hours. One strategy envisaged in the current plan is to develop electricity through investment by both the private and public sectors.

Electricity is a clean energy. Harnessing the economically feasible hydroelectricity in Nepal, as stated above, involves the construction of large reservoirs. But there have been big debates over macro (mega) and micro hydro projects. Construction of large reservoirs for power generation in the Hill region of Nepal can have negative impacts on the environment and ecosystem. Some of the major environmental and ecological problems of large dams, which impound large volumes of water, are reservoir siltation, land submergence, displacement of people, resource use conflicts, effects on natural aquatic and river habitats, local climate change, increase in incidence of landslides from steep hill slopes, water logging and salinity, and watershed disturbance. In order to mitigate these environmental consequences, measures such as watershed management and protection of upstream areas need to be adopted during the construction phase. On the other hand, micro-hydro projects ($\leq$100 kW) will have advantages on the following criteria (Amatya and Shrestha 1998): (a) relatively low capital investment requirements, (b) short construction period, (c) favorable local geography for micro-hydro potential, (d) simple operation, (e) distribution of micro-hydro projects in numerous locations, (f) use of indigenous technology of Nepali manufacture, and (g) government incentives in the forms of loans and subsidies. Further, micro-hydro projects appear to be much more feasible than macro-hydro projects in terms of environmental conservation and ecological balance.

Irrigation

The distribution of irrigation in 2000, the most recent year for which reliable statistics are available, is shown in Table 2.13. The irrigation capacity is expressed in terms of percentage of cultivated area of the district. A total of 829,788 ha (28% of the cultivated area) was irrigated by means of canal (permanent and seasonal), tube well or bore, pond or tank, and other means; in 1992, total irrigated land was only 504,482 ha.

The total cultivated area is 20% of the area of the country as a whole; the Terai has the largest proportion of cultivated area with 40% and Mountains the least with 5%. The Terai also has the highest proportion of irrigated area (50%) relative to its cultivated area and Mountains the lowest with 8%. More than 50% of the irrigated area is by seasonal canal.

In terms of individual districts, Mugu (mid-western Mountain district) with only 85 ha has a mere 0.7% of its total cultivated area irrigated, while Morang (eastern Terai district) has 96% of its cultivated land irrigated. The cultivated area as a percentage of district area ranges from 71% in Jhapa (eastern Terai district) to 0.36% in Manang.

Irrigation is a fundamental infrastructure for agricultural development in Nepal. At present, the agricultural sector is still very dependent on the monsoon rains due to lack of adequate irrigation. As

Table: 2.12: Electricity Connection to Households

Region	Number of Households		
	Total	Electricity	%
Mountain	285,213	60,630	21.26
Hill	1,951,191	834,789	42.78
Terai	1,938,053	749,080	38.65
Nepal	**4,174,457**	**1,644,499**	**39.39**

Source: CBS (2002b)

Table 2.13: Irrigation Facilities , 2000

Region	Cultivated Area (CA)		Irrigated Area	
	(ha)	%	(ha)	% of CA
Mountain	275,948	5.33	21,909	7.94
Hill	1,274,759	20.78	120,454	9.45
Terai	1,367,864	40.21	687,425	50.26
Nepal	**2,918,571**	**19.83**	**829,788**	**28.43**

ha = hectare, CA = cultivated area
Source: MOAC (2001)

80% of the population depends on agriculture, the development of this sector will help uplift the living standards of a majority of the population. The Agricultural Perspective Plan (1995–2015) incorporates irrigation as one of the main input priorities in its strategy. The National Water Resource Strategy adopted in 2002 has aimed to provide year-round irrigation to 60% of the irrigated land by 2007, and 80% and 90% by 2017 and 2027, respectively. The major challenge for the agricultural sector is to reach the target of 60% irrigated land from the present 28% within 2 years. A new irrigation policy formulated in 2003 aimed to: (a) provide year round irrigation service to the irrigable land by effectively utilizing the country's water resources, (b) develop the institutional capability of water users' associations for the sustainable management of existing systems, and (c) enhance the knowledge, skills, and institutional working capability of irrigation professionals, water users, and nongovernment associations relating to the irrigation development sector.

The Chitwan Irrigation Project is a pumping irrigation system in which the water of the Narayani River is lifted by pump. This project was considered a failure, as its reservoir and main canals were filled with fine sand after only 3 months of operation in 1984.

Source: KES (1986) p.129.

Irrigation development has environmental impacts in both the Hills and the Terai. Expansion of irrigation canals in the Hills and the Terai to cover all irrigable land may lead to several environmental problems summarized below (Adiga 1998).

In the absence of adequate watershed conservation, the use of dynamite in constructing contour canals along hill slopes causes slope instability, rock falls, landmass movements, and canal damage, disturbing the natural state of the habitat.

With the increased network of canal systems in the Hills and Mountains, water leakage and drainage problems may damage the physiography of the terrain causing soil erosion, whereas siltation problems may occur in the Terai.

Increased use of agro-chemicals together with irrigation water may further degrade the quality of soil, the water table (through seepage), and surface water (through runoff).

A considerable number of Terai inhabitants are being affected by arsenic contamination in groundwater. In the Terai, groundwater pumped for drinking purposes is also used for irrigation. Use of arsenic contaminated water not only affects crops but also results in the accumulation of arsenic in topsoil, which may again be harmful. Arsenic contaminated soils are a major source of contamination in the food chain through plant uptake and animal consumption and water supplies (Sijapati et al. 2004).

The following environmental mitigation measures are suggested.

- Water resources development and watershed management are closely linked. The success or failure of an irrigation project depends upon the upstream watershed condition of the project site. Watershed conservation and management should be an integral part of irrigation infrastructure development activities.
- Trees must be planted in and around farmland to reduce soil erosion, to decrease sediment in reservoirs and streams, to enhance the protection of wetlands and forest, and to preserve the long-term productivity of the land.
- Considerable financial resources have to be mobilized for environmental conservation.
- To sustain water sources and prevent sedimentation, impact assessments must be carried out for irrigation and other water-related projects (drinking water and hydropower) on project areas both upstream and downstream of the headwork.
- To alleviate pollution concerns, chemical fertilizers must be made a less desirable substitute for soil productivity, and conservation and public policy must subsidize organic fertilizers and soil erosion control techniques at the farm level.
- Environmental awareness campaigns should be intensified.
- To mitigate arsenic contamination in groundwater, innovative dug well (wide brimmed dug wells over 50 years old being converted to sanitary dug wells) with technical improvements such as slab cover, ventilator, wall sealing and raising of well wall, and arsenic removal filter should be adopted.

Health Services

The health services of Nepal include hospitals, health centers, health posts, and ayurvedic clinics. The distribution of health services by region is shown in Table 2.14 based on a 1999 Department of Health Services report, the most recent year for which reliable statistics are available. The distribution is uneven among regions. The Hill region has the highest percentage of health services. On average, one health service unit for the country as a whole covers 3.3 km^2 and serves 4,169 persons. In terms of area coverage, the Terai region has relatively better accessibility with one health service unit for 2.7 km^2,

Table 2.14: Health Service Accessibility

Region	Distribution of Health Services		Health Service (HS) Units and Population		Health Service (HS) Units and Area (km^2)	
	Units	%	Pop/HS	HS/10,000 Pop	Area/HS	HS/100 km^2
Mountain	620	13.95	2,336	3.67	5.7	1.20
Hill	2,323	52.25	3,642	2.27	3.1	3.79
Terai	1,503	33.81	5,741	1.34	2.7	4.42
Nepal	**4,446**	**100**	**4,169**	**1.92**	**3.3**	**3.02**

km^2 = square kilometer, HS = health service, Pop = population
Source: DOHS (1999)

Table 2.15: Education Accessibility

Region	Distribution of School Services		School Units (SU) and Population		School Units (SU) and Area (km^2)	
	Units	%	Pop/SU	SU/1,000 Pop	Area/SU	SU/100 km^2
Mountain	3,460	10.17	488	2.05	14.98	6.68
Hill	20,895	61.41	491	2.04	2.94	34.06
Terai	9,671	28.42	1,159	0.86	3.52	28.43
Nepal	**34,026**	**100.0**	**680**	**1.47**	**4.33**	**23.12**

km^2 = square kilometer, Pop = population, SU = school unit
Source: DOE (2000) pp. 4-9.

whereas the Mountain region has the fewest health facilities where one health service unit covers 5.7 km^2. The health services in the Terai have the greatest coverage of population (1.34 health service units (HS)/10,000), while the Mountain region has the lowest (3.67 HS/10,000 population).

Although the number of health facilities has increased each year, because of the exponential growth of population, health services are still too few and too far apart. There are few data available regarding the quality of these health services.

The basic challenge of the health sector is to improve access to and the quality of health services for the poor people in rural and remote areas. The major aspects of quality health service delivery are availability of health service units, medicines, and health personnel across rural regions; and generation of awareness of preventative methods. The latter are related to education, awareness, nutrition, and health and sanitation. One important but very ambitious policy formulated in the Tenth Plan is to make effective medicine available to poor backward communities year round through community insurance, cooperation, and partnership.

Education

Education services consist of all school types (public, community, and private) at all levels including primary, lower secondary, and secondary. Education facilities are measured for a district as a whole. Table 2.15 (based on the most recent reliable data available) shows that slightly under two-thirds of schools are located in the Hill districts, with one school serving an area of about 2.94 km^2. The school density in terms of area per school is lowest in the Mountain region, approximately 15 km^2 per school. But the Mountain region has an average of only 488 persons per school, whereas the Terai has 1,159 persons per school, far above the national average. This indicates that there is large population pressure on schools in the Terai districts.

There is a marked variation in school accessibility by district. Manang district has the smallest number of schools with 30 and Kathmandu district the most with 3,296. In terms of area, Kathmandu (Hill district) is the most accessible with one school serving an area of 0.12 km^2, and Manang (Mountain district) the least with one school serving an area of 74.87 km^2. Mustang (Mountain district) has the most schools per population served, one per 230 people, and Dhanusa (Terai district) the least, one per 1,691 people.

Most rural people are still illiterate, especially in poorer communities. The Tenth Plan has given priority to programs of literacy, and primary, non-formal, and technical education. The main slogan of the education sector is "Education for All". Some of the strategies envisaged by the current plan are to develop inclusive and integrated education systems in line with the concept of special needs education for groups with disabilities.

Summary

The above summaries of roads, electricity, irrigation, health, and education indicate a steady increase in providing these facilities in rural areas. However,

provision remains inadequate because of the exponential growth in population. Furthermore, the provision of the facilities in rural areas is grossly inadequate compared with urban areas. The distribution of facilities is also uneven by region. The Terai appears to be more accessible for services than the Hill and Mountain regions. In addition, there is little information available on the actual quality of the services.

The five services can be divided into two broad groups. The first group includes road, electricity, and irrigation, which are fundamental infrastructure for rural development in Nepal. Although provision of these infrastructures has provided beneficial impacts on social and economic environments, their availability in rural areas is too low and the efforts to provide them have been slow because of limited resources. On the other hand, development of these infrastructures has also been accompanied by a number of adverse environmental impacts such as landslides, slope instability, soil erosion, siltation, and loss of habitat and biodiversity. These negative environmental impacts have often been the result of incompatible techniques used for naturally dynamic and fragile slopes. Roads, electricity, and irrigation are interlinked. Watershed conservation and management should be an integral part of developing these infrastructures. Impact assessments for infrastructure projects should not only be carried out in situ but also in other potentially affected areas. Construction technologies for these infrastructures should be environmentally friendly (green roads, micro-hydro, and so on). Management and operation of these infrastructures should be by users' groups.

The second group includes health and education services, which are also fundamentals for environmental conservation and rural development. Most rural people depend directly on natural resources for their livelihoods, and the wellbeing and future of this society depends on its ability to live in harmony with the natural environment. Poor accessibility to health and education services is a major constraint to socioeconomic development efforts in Nepal. The majority of rural people are still illiterate, this is the challenge for education. The challenge to the health sector is to improve access and quality of health services for rural people. These services should be provided adequately in rural areas, with due attention given to sustainability.

Health and Sanitation

Rural Health

Quality drinking water and sanitation facilities are basic human needs. Development of this sector will have positive impacts upon health, and healthy workers will contribute to the growth of other productive sectors. Safe drinking water will significantly control waterborne diseases and minimize health expenses incurred in treating such diseases. Access to drinking water sources is important, as it relates to the time spent fetching water. The saved time can be utilized in productive work, in turn providing opportunities to earn more income and reducing poverty. Development of the drinking water sector contributes to healthy workers, additional income generation, and less health expenditure on treatment of diseases. In rural Nepal, many diseases are related to poor water and sanitation. Sanitation in rural Nepal can be described in terms of access of people to toilet types and wastewater generation and management, the condition of which indicates the state of environment.

Different parameters directly and indirectly related to health and sanitation are discussed in terms of rural and urban areas, and mountain, hill, and Terai regions.

Table 2.16 shows various health indicators contrasted between urban and rural areas. The performance of the selected health indicators is universally less in rural areas than in urban areas.

Table 2.16: Selected Health Indicators

Description	Urban	Rural	Nepal
Total fertility rate women age 15 –49 (expressed/woman) [a]	2.1	4.4	4.1
Current use of contraception (any method) — married men [a]	66.0	46.8	—
Chronic malnourishment of children under 5 years of age (%)	36.6	51.5	50.5
Life expectancy at birth	64.53	60.61	60.98
Population without access to safe water (%)	11.46	22.19	20.48
Population with access to sanitation (%)	77.06	32.05	39.22
Childhood mortality per thousand live bi rths			
Infant [a]	50.1	79.3	—
Child [a]	16.7	35.4	—
Under-5 [a]	65.9	111.9	—

— = not available
Source: UNDP (2001), [a]MOH/New Era/ORC Macro (2002)

The indicators for some common diseases are computed in terms of outpatient department (OPD) visits by region (Table 2.17). There are nine common waterborne and air (smoke) borne diseases. Compared with the national average, the relative incidence of skin disease among hospital outpatients is higher in the Terai, and that of intestinal worms, acute respiratory infection (ARI), gastritis, chronic bronchitis, and typhoid are lower than the national average. These diseases are most likely to occur as a result of poor quality drinking water and lack of nearby health facilities.

Table 2.18 lists the top ten diseases identified by the Department of Health Services of Nepal and Table 2.19 the incidence of diarrhea and ARI in children. Diarrhea among children below 5 years of age is more prevalent in the Mountains and the Terai than the national average (177 per 1,000). Diarrhea is related to the consumption of poor quality water. ARI is more prevalent in the Terai. In rural Nepal, ARI is related to the lack of outlets for smoke from solid biofuels due to poor ventilation. About 95% of rural households use solid fuel, including wood, cow dung, leaves, and straw, for cooking and heating (Table 2.20). The studies of Nepal Health Research Council (2003) and the Intermediate Technology Development Group (2004) show that ventilation is very poor in rural households and smoke from the use of solid fuel remains indoors for long periods, which could be increasing respiratory problems.

According to the Department of Health Services annual report 2003, based on the data recorded in the health services, the percentage of malnourished children below age 3 measured in terms of underweight is higher in the Mountain and Terai regions than the country average (Table 2.21).

Table 2.17: Common Diseases by Region

Diseases	Annual Incidence of Specific Disease (of OPD Visits) [a]			
	National (*N*=8,642,852)	Mountain (*N*=807,663)	Hill (*N*=4,091,291)	Terai (*N*=3,743,898)
Skin disease	175.3	116.7	136.6	229.5
Diarrheal disease	101.4	112.1	105.0	95.2
Intestinal worms	92.6	113.9	100.0	80.0
Acute respiratory infection	87.2	104.5	97.5	72.4
Gastritis	58.2	63.9	63.4	51.3
Chronic bronchitis	30.4	31.0	32.9	27.5
Anemia	28.1	22.5	26.2	31.3
Typhoid	28.0	32.5	27.2	27.9
Jaundice and infectious hepatitis	3.5	2.7	3.0	4.1

N = number, OPD = outpatient department
Note: Figures in parentheses for each ecological region are OPD visits.
[a]Annual incidence of specific disease —number of specific cases in a specific year x 1,000 per total number of OPD visits in the same year.
Source: DOHS (2003)

Table 2.18: Ten Leading Diseases, 2001

Disease	National (*N*= 8,642,852)	Percent of Total OPD Visits by Region		
		Mountain (*N*= 807,663)	Hill (*N*= 4,091,291)	Terai (*N*= 3,743,898)
Skin disease	5.76	5.38	5.18	6.35
Diarrheal disease	3.44	5.00	3.94	2.73
Acute respiratory infection	3.38	4.69	3.69	2.90
Intestinal worms	2.76	4.44	2.99	2.28
Pyrex	2.30	2.58	2.16	2.37
Gastritis	2.20	3.14	2.56	1.71
Ear infection	1.56	1.89	1.45	1.61
Chronic bronchitis	1.20	1.41	1.36	1.02
Abdominal pain	1.05	1.40	1.13	0.93
Sore eye complaints	1.02	1.89	1.22	0.71

Note: Figures in parentheses indicate total OPD visits
Source: DOHS (2003)

Malnutrition remains a serious obstacle to survival, growth, and development in Nepal. There are different forms of malnutrition. The most common forms in Nepal are protein-energy malnutrition, iodine deficiency disorder, and deficiencies of iron and vitamins. The Nepal Demographic and Health Survey conducted in 2001 showed that 51% of the sample children (N = 6877) below 5 years of age were affected by stunting (short for their age), which can be a sign of early chronic under-nutrition. The survey also found that 46% of children below age 5 are underweight (low weight for age). In addition 9% are wasted (thin for their height), an indicator of acute malnutrition. According to the survey (2001), one important cause of protein energy malnutrition in Nepal is that 30%–50% of children are born with low birth weight (weight below 2.5 kg). Low birth weight also leads to an intergenerational cycle of malnutrition (DOHS 2003).

Improvement Measures

Table 2.22 lists health indicators and their status and target by the current Tenth Plan. Increasing the availability of essential health services from 70% to 90% by the end of the Tenth Plan (2007) necessitates increasing the number of health institutions in rural Hills and Mountains, given the scattered settlements.

The Expanded Programme on Immunization is considered one of the most cost-effective health interventions. The present program covers all 75 districts of the country with appropriate interventions to achieve the targets.

The Ministry of Health has developed a Second Long Term Health Plan 1997–2017. The aim of this plan is to guide health sector development in improving the health of the population, particularly those whose health needs are not now met. According to the plan, priority is to be given to health promotion and prevention activities based on primary health care principles. It identifies essential health care services that address the most essential health needs of the population.

Further, the strategy includes not only curative care interventions but also preventive components. The Convention on the Rights of the Child states the right of the child to enjoy the highest attainable standard of health and to have access to health services. In this sense integrated management of childhood illness has been successful in

Table 2.19: Incidence of Diarrhea and Acute Respiratory Infection (ARI) per '000 Population Below 5 years of Age

Region	Number of Diarrhea Patients	Number of ARI Patients
Mountain	195	215
Hill	167	180
Terai	184	277
Nepal	**177**	**229**

ARI = acute respiratory infection
Source: DOHS (2003)

Table 2.20: Distribution of Households by Main Fuel Used for Cooking

Region	Wood (1)	Cow Dung/ Leaves/ Straw (2)	Total Solid Fuel (1+2)	Kerosene	LPG	Other[a] Fuel
Mountain	99.7	0	99.7	0	0	0.3
Hill	76.8	1.3	78.1	6.5	6.5	2.1
Terai	57.0	31.9	88.9	3.6	3.6	2.8
Rural	76.7	17.8	94.5	1.6	1.6	2.0
Urban	30.6	4.8	35.4	19.9	19.9	3.9
Nepal	**69.1**	**15.7**	**84.8**	**4.7**	**8.2**	**2.3**

LPG = liquefied petroleum gas
[a] Other fuels include electricity, biogas, coal or charcoal, and other categories.
Source: NLSS (2004)

Table 2.21: Malnourished Children Below Age 3 (%)

Region	Total	Normal	% Malnourished
Mountain	55,432	45,438	18.0
Hill	384,582	327,316	14.9
Terai	393,948	329,713	16.3
Nepal	**833,962**	**702,467**	**15.8**

Source: DOHS (2003)

Table 2.22: Status and Target of Health -Related Indicators, 2001

Health Indicators	Status	Target
Availability of essential health services (%)	70.0	90.0
Pregnant mother attending four antenatal visits (%)	16.0	50.0
Women of 15–44 age group receivi ng TT vaccines (%)	15.0	50.0
Contraceptive prevalence rate (%)	39.3	47.0
Use of condoms for safe sex (14 –35 years) (%)	35.0	35.0
Total fertility rate (women of 15 –49 years)	4.1	3.5
Crude birth rate per 1,000	34.0	30.0
Birth attendance by trained health workers (%)	12.7	18.0
Newborn infant mortality (per 1,000 live births)	39.0	32.0
Infant mortality (per 1,000 live births)	64.0	45.0
Crude mortality rate (per 1,000)	10.0	7.0
Maternal mortality rate (per 100,000)	415.0	300.0
Child mortality (below 5 years old) per 1,000 live births	91.0	72.0
Life expectancy at birth (years)	61.9	65.0
Total expenditure to total government budget (%)	**5.2**	**6.5**

Source: NPC (2002)

B. Pradhan

Ordinary Dug Well in the Terai Region

B. Pradhan

Improved Dug Well with Protective Cover

protecting the rights of children. Today, this approach has proved to be one of the most successful strategies for the survival of children in many countries.

Diarrheal diseases are a major public health problem among children under five. The National Control of Diarrheal Diseases Programme has been accorded high priority by the government and remains an integral part of primary health care. Improvement in diarrheal case management will be a primary strategy for reducing mortality among children under five years of age. Standard diarrhea case management will be provided in health institutes by establishing oral rehydration therapy corners in all health institutions. The main objective of the National Control of Diarrheal Diseases Program is to reduce mortality due to diarrhea and dehydration from the current 30,000 deaths per year to a minimum and to reduce morbidity from 3.3 episodes per child per year to a minimum.

Rural Sanitation

Rural sanitation refers to access of rural households to drinking water sources, drinking water coverage, types of toilet, and wastewater generation.

Drinking Water

Table 2.23 shows the proportion of households having access to different sources of drinking water for the respective regions as a whole. Most people living in the Mountains and Hills are provided with tap or pipe water, whereas in the Terai tube wells are the main source of drinking water. The national average of access to tap water is 53%. Tap water is said to be safe water. In rural Nepal, most drinking water is provided through public taps. Other water sources such as wells, tube wells, water spouts, and rivers are commonly used by the rural poor.

A Department of Water Supply and Sewerage study in 2002 estimated the drinking water access for the rural population (Table 2.24). By the end of 2007, it is estimated that 92% of the total rural population will be covered with improved drinking water systems provided by different government programs. By 2015, all rural people in the country will have access to a drinking water supply.

Toilet Access

The access of households to toilets in rural and urban areas is shown in Table 2.25. In 2001, the most recent year for which reliable statistics are available, 46% of all households had access to toilets, more in the Hills and less in the Mountains and Terai. Two types of toilet facilities—flush and ordinary (pit)—are identified by the census (CBS 2002b). People using flush or modern toilets are less vulnerable to health risks than those using ordinary toilets. For the country as a whole, only 23% of households had access to modern toilets, and 23% had ordinary toilets. Mountain households had the lowest access (7.9%) to modern toilets. Overall some 40% of rural

Table 2.23: Household Accessibility to Drinking Water by Sources, Nepal

Region	Total Households	Percent of Total Households					
		Tap/ Pipe	Well	Tube Well	Spout Water	River/ Stream	Other
Mountain	285,217	72.2	6.24	0.0	17.1	3.4	1.0
Hill	1,950,345	72.2	11.99	2.4	10.1	2.0	1.2
Terai	1,938,895	30.8	6.48	58.6	1.1	0.6	2.5
Nepal	**4,174,457**	**52.9**	**9.04**	**28.4**	**6.4**	**1.5**	**1.8**

Source: CBS (2002b)

Table 2.24: Existing and Projected Rural Population Drinking Water Coverage

Region	Population 2001	Coverage (%)	Population 2007	Coverage (%)	Population 2015	Coverage (%)
Mountain	1,461,327	77	1,564,008	92	1,717,433	100
Hill	8,360,758	66	9,294,045	89	10,749,057	100
Terai	9,686,970	72	11,316,490	94	13,957,008	100
Nepal	**19,509,055**	**71**	**22,174,543**	**92**	**26,423,498**	**100**

Source: DWSS (2002)

Table 2.25: Toilet Accessibility by Region and Rural–Urban Areas

Region	Total Toilet Households	% Toilet Coverage	Toilet as % of hh		Toilet as % of Rural Toilet hh		Toilet as % of Urban Toilet hh	
			Modern	Ordinary	Total	Ordinary	Total	Ordinary
Mountain	115,157	40.4	7.9	32.5	41.6	82.2	65.4	68.4
Hill	1,088,474	55.8	26.9	28.9	48.4	60.4	87.5	31.3
Terai	722,121	37.3	20.6	16.6	32.6	48.9	64.1	32.1
Nepal	**1,925,752**	**46.1**	**22.7**	**23.4**	**40.3**	**57.6**	**77.1**	**32.1**

hh = households
Source: CBS (2002b)

households had toilets compared with 77% in urban areas. In the Terai region 49% of rural households with a toilet had an ordinary toilet; whereas in the other two regions, the proportion was over 60%. In the Mountain region, 82% of households with a toilet had an ordinary toilet.

Open defecation is common for households that do not have toilets. This is the main source of waterborne diseases. Thus mere curative health facilities such as provision of health service units and other types of facilities will not control common diseases related to poor sanitation. Health program and policy measures should focus on maximizing access to safe drinking water and toilet (sanitation) facilities and increasing awareness of people of the need to use toilets. This will not only minimize expenses on health problems in the long run, but also mitigate the sanitation-related poor environment, which again will curtail the ever-increasing cost of medical care.

Wastewater Generation

Wastewater refers to water that has been used and is no longer clean. Table 2.26 summarizes the wastewater situation in rural and urban areas of Nepal. The total wastewater generation for 2001 has been estimated at 981 thousand cubic meters (m^3) per day for the country as a whole based on Metcalf and Eddy (1999). The wastewater generation per hectare in rural areas is 60 m^3; it is 9 times as high in urban areas (530 m^3). Most of the large cities and towns are in the Hill and Terai regions, and as a result the wastewater generated in the Hills and Terai is much higher than in the mountains. Environmental pollution (rivers, ponds, groundwater, and air) due to increasing wastewater generation is basically an urban problem. Compared with urban areas, the pollution due to wastewater is less significant in rural areas. However, other factors such as open defecation, industries, agri-pests, and fertilizers affect the environment in rural areas.

In urban areas of Nepal, kitchen, laundry, and bath wastewater are normally mixed with toilet wastewater and connected to the drain, which is then directly discharged into the local river. Industrial wastewater is also directly discharged into rivers in most cases. There is no recycling or reuse of wastewater in urban areas[2]. However, reuse of wastewater is made at the individual farmer level. Vegetable farming in Kathmandu Valley is often irrigated by household wastewater. The use of domestic wastewater is a tradition of local farmers. Domestic wastewater is usually accumulated in

Table 2.26: Wastewater (Sewage) Generation ('000m^3)

Region	Wastewater (ww) generation/day	Urban ww/ha	Rural ww/ha
Mountain	68.95	0.15	0.01
Hill	437.89	0.65	0.06
Terai	474.36	0.47	0.12
Nepal	**981.21**	**0.53**	**0.06**

ha = hectare, m^3 = cubic meter, ww = wastewater
Source: Metcalf and Eddy (1999)

[2] A very small portion of the wastewater draining into the Bagmati River from Kathmandu is treated in the middle section at the Pashupati temple area, which is mainly for religious purposes; further downstream wastewater is discharged into the river without treatment.

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Poor Drainage System in a Terai Village

ponds for some days to allow settling and afterwards used in agriculture. Pollution of rivers by untreated domestic and industrial wastewater has a direct impact on the local environment and health, as the water is used for cleaning vegetables, bathing, washing clothes, and drinking for livestock.

Sanitation System

A sanitation system refers to liquid wastes being connected to underground drains (sewers). Slightly over 12% of households have access to sanitary facilities (drains); but only about 4% of rural households compared with 54% of urban households (Table 2.27). Much of the wastewater is discharged into open drainage systems and is not sanitary. In the Terai, because of the very low gradient, wastewater tends to become stagnant water, providing a good place for mosquito breeding. This is one of the reasons for the increase in vector-borne diseases in the Terai. Sixty-five of the country's 75 districts are malaria-risk districts.

Summary

The policy measures and programs with respect to health and sanitation are described in Chapter 5 on water resources.

Health and sanitation conditions are measured in terms of health indicators such as chronic malnourishment among children under 5 years of age, life expectancy at birth, and population without access to safe water. Rural areas have lower values for these indicators than the national average. The incidence of diseases like intestinal worms, ARI, gastritis, chronic bronchitis, and typhoid that occur due to poor quality drinking water is generally high in Nepal. Compared with the national average, the comparative incidence of diarrheal disease is higher in the Mountains and Hills, whereas the comparative incidence of skin disease is higher in the Terai. ARI due to smoke pollution as a result of poor ventilation is high in rural areas.

Table 2.27: Percentage of Households with Access to Sanitary Facilities (Drains)

Region	% of Households
Mountain	1.0
Hill	18.7
Terai	7.4
Rural	3.7
Urban	54.4
Nepal	**12.1**

Source: NLSS (2004)

Poverty

Rural Poverty

Poverty in Nepal is widespread. Although sources indicate that the level of poverty in Nepal has been rising, the latest estimates indicate that it has now decreased. The poverty survey in 1976 showed that 33% of the population fell below the poverty line and that poverty was most prevalent in rural areas. In 1978, the population below the poverty line was estimated to be 36%, which again increased to 42% in 1985. The 1996 poverty survey (Table 2.28) also showed the national poverty level at 42%, with 25% and 17% being poor and very poor, respectively (NPC 2002). At present, the poverty level is estimated at 31% according to the 2004 NLSS Report.

Poverty in Nepal is largely a rural phenomenon. In 1996, 44% of the rural population lived in poverty compared with 23% in urban areas (Table 2.28). The incidence of poverty was highest in the Mountain regions (56%). There is a wide variation in poverty within rural areas. For example, the poverty rate was highest in the more remote rural areas of the mid-western and far-western Hills and Mountains, where it was as high as 72%. The rural mid-western and far-western Terai regions were also poorer (53%).

Measured in terms of indicators like adult literacy, life expectancy, population without access to safe water, and human poverty index, poverty is more widespread in rural and mountain than in urban areas. The condition of all five selected parameters (Table 2.29) is better in urban areas than in rural areas. Access to safe water, an important indicator of poverty, is better in the Terai than the national average.

Poverty can also be described by its intensity measured in terms of poverty gap and poverty severity related to the total population of the region (Table 2.28). In 1996, the figures for poverty gap and poverty severity were 12% and 5% respectively for the country as a whole. The values for the Terai were lower than the national average, whereas those for

Table 2.28: Income Poverty Indicators in 1996 (Poverty Line: NRs 4 ,404/person/year)

Area	Poverty Incidence % People Living Below Poverty Line	Poverty Gap/ Intensity of Poverty (%)	Sensitivity of Poverty (%)
Mountain	56	18.5	8.2
Hill	41	13.6	6.1
Terai	42	9.9	3.4
Urban	23	7.0	2.8
Rural	44	12.5	5.1
Nepal	**42**	**12.1**	**5.0**

Source: NPC (2002) pp. 14–20.

Table 2.29: Some Indicators of Poverty

Area	Adult Literacy (>15 yrs)	Life Expectancy (yrs) at Birth	Population without Access to Safe Water (%)	Human Poverty Index	HDI (Index = 1)
Nepal	48.6	60.98	20.48	39.6	0.46
Urban	68.3	64.53	11.46	25.2	0.61
Rural	45.0	60.61	22.19	42.0	0.44
Mountain	36.1	52.55	28.01	49.8	0.37
Hill	52.3	65.50	27.70	38.8	0.51
Terai	46.1	63.93	12.10	39.6	0.47

HDI = Human Development Index, yrs = years
Source: UNDP (2004) pp. 141–161.

the Hills and Mountains were higher (14% and 6%) and much higher (19% and 8%). These values suggest that poverty is much worse in the Hills and Mountains than in the Terai. The percentages of poverty gap and poverty severity are greater for rural areas than for urban areas.

Upper social groups like Bahuns, Newars, and Yadavas have much lower poverty levels than lower social groups. In general, the Janajati groups (indigenous ethnics) have higher poverty levels than the national average ranging from 45% to 59%, while the Dalits (scheduled castes) have poverty levels as high as 65%–68% (NPC 2002). The upper caste Chhetris also have an above-average poverty rate at 50%, while Muslims are relatively better off in terms of poverty incidence. The indigenous Limbus have the highest rate of poverty with 71%.

Table 2.30 shows various poverty and human development indicators for different caste and ethnic groups. Compared with the national average, the three upper social groups (Newars, Bahuns, and Chhetris) have better levels of selected poverty indicators (life expectancy, adult literacy, mean years schooling, and per capita income) and human development indices than other groups like the Dalits, Madhise, and Muslims.

The status of some development measures also indicates poverty level. The present national Human Development Index (HDI) value is estimated at 0.471, one of the lowest in the world, although it has increased from 0.403 in 1996. There is a big disparity between urban and rural areas because of differences in availability of human development facilities. The HDI in urban areas is 0.581 compared with 0.452 in rural areas, where most people reside (UNDP 2004). Interestingly, the increase in HDI was less than 3% in urban areas compared with 17% in rural areas during the years 1996–2001. The HDI is lowest in the mountains (0.386), followed by the Terai (0.478) and the Hills (0.512). HDI also varies among the development regions. The HDI value for the Mid-Western and Far-Western development regions is less than the national average.

The Nepal Human Development Report 2004 estimates that the human poverty index for Nepal is 39.6, which is greater than for any of the other South

Table 2.30: Poverty and Human Development by Caste and Ethnicity

Indicator	Nepal		Caste and Ethnicity (1996) [b]						
	2001[a]	1996 [b]	Bahun	Chhetri	Newar	Madhise	Dalit	Muslim	Other
Human Poverty Indicators									
Life Expectancy Years	60.9	55.0	60.8	56.3	62.2	58.4	50.3	48.7	54.4
Adult Literacy (15+) (%)	48.6	36.7	58.0	42.0	54.8	27.5	23.8	22.1	27.6
Mean Years Schooling	2.7	2.3	4.7	2.8	4.4	1.7	1.2	1.4	1.9
Per Capita Income (NRs)	15,162	7,673	9,921	7,744	11,953	6,911	4,940	6,336	73,12
Human Development Indices									
Life Expectancy Index	0.60	0.50	0.597	0.522	0.62	0.55	0.422	0.395	0.49
Education Attainment Index	0.38	0.29	0.490	0.342	0.46	0.22	0.186	0.178	0.22
Income Index	0.43	0.17	0.237	0.181	0.28	0.16	0.11	0.145	0.17
Human Development Index	0.47	0.32	0.441	0.348	0.45	0.31	0.23	0.239	0.29
National HDI Ratio	100	100	135.9	107.3	140.7	96.3	73.6	73.7	90.9

HDI = Human Development Index
Source: [a]UNDP (2004); [b] NPC (2002) (data refer to 1996, the most recent data available for different castes and ethnicities).

Asian countries except Bangladesh and Pakistan (UNDP 2004). The human poverty index in rural areas (42.0) is significantly higher than that in urban areas (25.2). The incidence is most pronounced in the Mountains (49.8), followed by the Terai (39.6) and Hills (38.8).

The human empowerment index (HEI), which is a composite index of social, economic and political indicators, is 0.463 across the country, indicating a low level of empowerment. The level of economic development for the country is 0.337 which is below the social empowerment level of 0.406, while political empowerment stands at 0.646. Among the regions, the Terai has a better HEI value (0.476) than the Hills (0.451) or Mountains (0.359); a higher economic empowerment index (0.392 compared with 0.310 and 0.236); and higher political empowerment index (0.674, compared with 0.568 and 0.526). The economic empowerment index of the Terai is 16% higher than the national average. However, the social empowerment index is highest in the Hills (0.476), followed by the Terai (0.362) and the Mountains (0.315).

The HEI for urban areas is 0.620 compared with 0.439 for rural areas. Urban areas surpass rural areas in all three dimensions of human empowerment. For instance, social empowerment in rural areas (0.372) is just 60% of that in urban areas (0.604). In terms of economic empowerment, the value for rural areas is 0.304, which is about 59% that of urban areas (0.518), due to higher per capita income and better access to economic infrastructure and employment opportunities. The per capita income level in rural areas is less than half the level in urban areas. The rural–urban disparity in political empowerment is less pronounced. The political empowerment score in urban areas (0.737) is only 15% higher than that in rural areas (0.642). The overall HEI value is highest in the central development region (0.497), decreasing in other development regions towards east and west.

Summary

The level and intensity of poverty are closely linked to the pace and pattern of economic growth in urban and rural areas and the income generating opportunities associated with such growth. Rural poverty is worse, primarily because agricultural growth—the primary source of income and employment generation in the rural economy—has stagnated in per capita terms over the past few decades. Even within rural areas, the poorer segments of the population have less access to fertile land, irrigation, modern inputs, credit, and marketing and road infrastructure. Similarly, a key determinant of the level and intensity of both income and human poverty is the limited or nonexistent access to basic social and economic infrastructure. The rural areas are badly underserved in terms of quality and coverage of basic education, healthcare, drinking water, roads, and access to other infrastructure and markets.

Poverty is also closely related to the degree of social, political, and economic inclusion or exclusion. Women and ethnic groups by and large are left out of the mainstream of development because they lack voice, empowerment, representation, and access to economic opportunities and resources. Similarly, remote districts further away from centers of power and influence are the most neglected. Another key determinant, which cuts across and exacerbates the impact of these factors on the poverty pattern, is weak governance, which includes ineffective government, poor resource allocation, weak implementation and service delivery performance, and corruption and leakages, among other factors.

Livelihoods

Major Activities

The living condition of the people of Nepal is determined by the amount and type of resources available and by the ways the resources are utilized. Most people still depend on environmental resources for securing livelihoods. The means of livelihood is generally related to employment opportunities, which are the outcome of investment and development efforts in utilizing the resources. Employment is linked to the process of development. The livelihood of people is reflected through the employment structure and the proportion of people gainfully employed in different economic activities.

It is evident that there was a gradual shift from traditional agriculture to non-agricultural sectors between 1991 and 2001, the most recent year for which reliable statistics are available (Table 2.31).

The agriculture, forestry, and fishery industry is the largest in terms of employment in each region—the Mountains, Hill, and Terai—with the highest proportion (81%) in Mountain areas (Table 2.32).

The major industries are conventionally reclassified into three broad production sectors: primary, secondary, and tertiary. The primary production sector includes agriculture, forestry, and fishery. The secondary sector comprises mining and quarrying and manufacturing and construction. The tertiary sector consists of electricity, gas and water supply; wholesale and retail trade; transport, storage and communication; finance and business services; personal and community services; and others. The latter two sectors combined can also be referred as

Table 2.31: Change in Employment Structure by Major Industries (economically active pop ulation 10 years of age and above)

Industry	1991		2001		Change (%)
	Number	%	Number	%	
Agriculture, forestry, and fishery	5,959,788	81.22	6,504,688	65.70	9.14
Mining and quarrying	2,361	0.03	16,049	0.16	579.75
Production and industry	150,051	2.04	872,252	8.81	481.30
Electricity, gas, and water supply	11,734	0.16	148,217	1.50	1163.14
Construction	35,658	0.49	286,419	2.89	703.24
Hotels, restaurants, and finance	256,012	3.49	984,662	9.95	284.62
Transport, storage, and communications	50,808	0.69	161,637	1.63	218.13
Real estate, renting, and business activities	20,847	0.28	76,687	0.77	267.86
Public administration and social security	752,019	10.25	748,916	7.56	(0.41)
Other	98,302	1.34	100,669	1.02	2.41
Total population	**7,337,580**	**100.0**	**9,900,196**	**100.0**	**34.92**

Source: CBS (2003) Volume I, pp. 341 –371.

Table 2.32: Percentage Distribution of Economically Active Population by Major Industrial Sectors and Region, 2001

Industry	Mountain	Hill	Terai
Agriculture, forestry, and fishery	80.7	68.5	59.8
Mining and quarrying	0.1	0.2	0.2
Manufacturing	5.3	8.1	10.2
Electricity, gas, and water supply	1.3	1.5	1.6
Construction	1.2	2.2	4.0
Commerce	6.2	8.9	11.8
Transport and communication	0.6	1.4	2.1
Finance and business activities	0.2	0.8	0.9
Personal and community services	3.8	6.9	7.0
Others	0.5	1.3	2.2
Not Stated	0.2	0.3	0.2

Source: CBS (2003) Volume I, pp. 341 –371.

Table 2.33: Percentage Distribution of Economically Active Population by Major Industrial Sector for Rural and Urban Areas, 1991 –2001

Sector	1991		2001		Country	
	Rural	Urban	Rural	Urban	1991	2001
Primary	85.5	60.9	72.3	42.2	81.2	65.7
Secondary	1.9	12.4	10.2	18.0	2.6	11.9
Tertiary	11.4	26.1	17.4	39.6	15.0	22.2
Unspecified	1.2	0.6	0.2	0.3	1.2	0.2

Source: CBS (2003) Volume I, pp. 341 –371.

the "non-primary production sector". The primary sector has dominated in terms of employment in both rural and urban areas (Table 2.33). However, the percentage share of primary sector employment decreased in both rural and urban areas from 1991 to 2001.

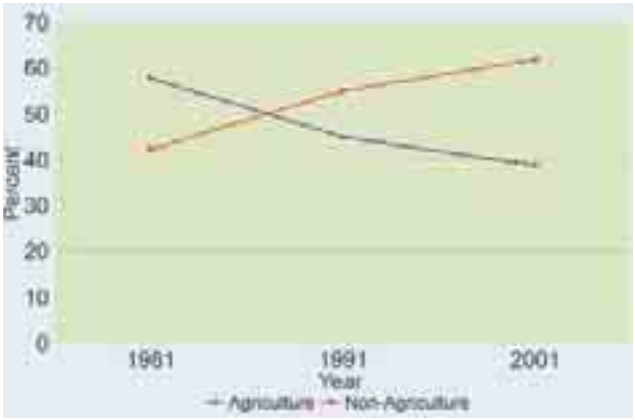
Though the primary production sector's contribution to GDP is less than that of the non-primary production sector (Table 2.34, Figure 2.3), the share of the former (38% in 2001) is still significant. The non-primary sector's contribution increased to 62% of total GDP ($5.6 billion) in 2001 from 54% in 1991.

The primary production sector remains an important source of livelihood for most rural people of Nepal. Table 2.35 shows that 36.5% of all households had agricultural land, livestock, and poultry in 2001; households with only agricultural land and livestock were 29%; and households with only agricultural land were 9%. Households without any of these assets (land, livestock, or poultry) accounted for 19%. The share of agricultural households with all three agricultural assets is largest in Mountain and Hill areas and that of households with land and livestock in Mountain and Terai regions (the most common group overall in the Terai).

Employment and Income Status

Employment source is classified into three major types: wage employment, self-employment, and other (NLSS 2004). Self-employment is the major source of income in Nepal, accounting for 47% of total household income. It is even more dominant in rural areas (50%) and in the Mountains (60%). Income from wage labor is most important in urban areas, accounting for 35%. Wage income and others are the second and third important sources for the country, rural areas, and all three ecological regions; while in urban areas income from other sources is next to wage employment.

Figure 2.3 Contributions by the Primary and Non-primary Production Sectors to National GDP



Source: CBS (2003)

Table 2.34: Contribution to GDP by Sector (%)

Sector	1991	2001
Agriculture, fisheries, and forestry	46.5	37.9
Mining and quarrying	0.5	0.5
Manufacturing	7.0	9.5
Electricity, gas, and water	1.4	1.7
Construction	10.5	9.5
Trade restaurant and hotel	10.7	11.8
Transport and communication	5.7	7.6
Finance and real estate	9.5	10.0
Community and social service	8.3	9.3
Total	**100.0**	**100.0**

GDP = gross domestic product
Source: CBS (2003) Volume I, pp. 341 –371.

Table 2.35: Households Having Agricultural Land, Livestock, and Poultry by Region, 2001

Asset	Mountains		Hills		Terai		Total	
	No.	%	No.	%	No.	%	No.	%
Agricultural land only	17,444	6.12	142,744	7.32	226,053	11.66	386,241	9.25
Livestock only	1,877	0.66	16,010	0.82	104,896	5.41	122,783	2.94
Poultry only	945	0.33	8,024	0.41	15,371	0.79	24,340	0.58
Land and livestock	91,989	32.25	460,488	23.60	636,117	32.82	1,188,594	28.47
Land and poultry	3,517	1.23	23,156	1.19	25,573	1.32	52,246	1.25
Livestock and poultry	2,539	0.89	15,735	0.81	52,278	2.70	70,552	1.69
Land, livestock, and poultry	150,975	52.93	922,689	47.29	453,339	23.39	1,527,003	36.58
None	15,927	5.58	362,345	18.57	424,343	21.90	802,615	19.23
Total	**285,213**	**100.00**	**1,951,191**	**100.00**	**1,937,970**	**100.00**	**4,174,374**	**100.00**

Source: CBS (2002a)

Income[3] sources according to NLSS 2004 include farm income, non-farm income, remittances, consumption of own dwelling (or rent free dwelling), and others (renting out non-agricultural property like buildings or assets, earnings, savings and deposit accounts, shares, pension, and so on). Income from the farm sector accounts for 48% of total household income, followed by the non-farm sector (28%), remittances (11%), consumption of own housing (10%) and others (4%) (Table 2.36). The farm sector is the most important source of household income in all three regions, in rural areas, and in the country as a whole. The Mountain area is the most dependent on the farm sector, followed by the Terai.

There is an increasing trend of income from remittances. The proportion of households receiving remittances from abroad increased from 23% in 1995/96 to 32% in 2003/04. There has been a significant change in the share of remittance amounts by source.

Table 2.36: Share of Household Income by Source (%)

Region	Farm Income	Non-farm Income	Remit-tances	Own Housing Consumption	Other
Mountain	59	19	9	10	3
Hill	45	28	11	12	5
Terai	49	28	12	8	3
Rural	55	23	11	8	3
Urban	13	54	10	17	6
Nepal	**48**	**28**	**11**	**10**	**4**

Source: NLSS (2004) Vol. 2, Table 11.2 .

Eight years ago, the remittance amount from within Nepal and India accounted for 75% of total transfer income. Now, the share of other countries including the Gulf countries accounts for more than half of the total remittance amount (NLSS 2004).

[3] Income was defined as the flow of resources in a household in the past 12 months. The main components considered in the income measure are incomes from crops, non-crop farm, reported valuation of housing consumption of own dwelling, wage employment, non-farm employment, remittances, rental, and other sources.

In 2004, the average annual household income (average household size 5.3) was NRs 80,111, yielding an average annual per capita income of NRs 15,162 (NLSS 2004). The average per capita income in urban areas was NRs 32,573, compared with NRs 12,124 in rural areas; it was higher in the Hills (NRs 18,299) than in the Terai (NRs 12,975) and the Mountains (NRs 12,295).

Landholding Distribution and Land Fragmentation

Landholding distribution and land fragmentation can be related to population growth and distribution. Rapid population growth has increased pressure on agricultural land, resulting in encroachment of marginal lands on fragile hill slopes. This has serious environmental repercussions.

Data on area and fragmentation of landholdings have been derived from the National Census of Agriculture (CBS 2004), the most recent source available. These data on cultivated area are based on national census households; however, they do not match the data derived from mapping sources such as satellite imagery, aerial photographs, and toposheets (which have been used for computing land use categories of the country). According to the agriculture census (CBS 2004), the average landholding size for the country in 2001/02 was 0.79 ha, down from 0.95 ha in 1991/92. The pressure of population on cultivated land has increased considerably. This pressure is even more severe in Hill areas, where the average landholding size is now 0.66 ha (Table 2.37). Households in rural areas have an average agricultural landholding of 0.8 ha compared with 0.5 ha for urban areas.

Average landholdings have decreased, mainly as a result of a decrease in the number of parcels held by a family (CBS 2004 and Table 2.37). The average parcel size and total number of parcels has changed little over the years. Both the average holding size and the average parcel size are largest in the Terai. The average parcel size is smallest, and the number of parcels per holding largest in mountain areas, reflecting the fragmented nature of the landscape.

The distribution of cultivated land is highly skewed. The 2001/02 agriculture census shows that 25% of the total landholdings account for over 61% of the total cultivated land (CBS 2004a). Although the average landholding size was 0.79 ha, nearly 75% of farm holdings were smaller than 0.5 hectare, and accounted for only 39% of all cultivated land. The NLSS shows that 45% of farmers cultivate less than 0.5 ha of land and 8% of farmers cultivate 2 ha or more. Small farmers (less than 0.5ha) cultivate only 13% of all agricultural land as compared with 31% cultivated by large farmers.

Production Pattern

The country's cereal crops are paddy, maize, wheat, millet, and barley. Major cash crops include sugarcane, oilseed, and potato. The area under different crops is shown in Table 2.38. The cropped area is greater than the cultivated area because some areas carry two or even three different crops in a year. Paddy is the principal crop in terms of cropped area, accounting for 45% of the total cropped area of the selected crops in the country.

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Young Women Preparing a Field for Winter Vegetable Crops in Kathmandu Valley

Table 2.37: Area and Fragmentation of Landholdings

Description	Mountain		Hill		Terai		Country	
	1991/92	2001/02	1991/92	2001/02	1991/92	2001/02	1991/92	2001/02
Number of landholdings ('000)	260.7	298.2	1357.7	1,586.4	1117.6	1,479.5	2,736.1	3,364.1
Total area of holdings ('000ha)	176.9	218.7	1047.3	1,038.6	1374.8	1,396.7	2,598.9	2,654.0
Average holding size (ha)	0.68	0.73	0.77	0.66	1.23	0.94	0.95	0.79
Number of parcels ('000)	1207.0		5317.7		4282.0		10,806.2	10,987.0
Average parcels per holding	4.6		3.9		3.9		4.0	3.3
Average parcel size (ha)	0.15		0.21		0.32		0.23	0.24

ha = hectare
Source: CBS (2004) p. 112.

Maize and wheat are the second and third most important crops in terms of cropped area. These three cereal crops have different positions in the different regions. In terms of cropped area, paddy is the most important crop in the Terai (61%); and maize the most important crop in the Hills (38%) and Mountains (29%). Likewise, paddy is the second most important crop in the Hills and wheat in the Mountains and Terai.

Among the cash crops, the Terai has the largest cropped area of oilseeds, and Hill areas the largest cropped area of potato. Sugarcane has the next largest cropped area in the Terai, and oilseed in the Hills. Cropping intensity, measured by the total cropped area divided by the total cultivated area, is greater in the Terai (1.23) than in the Hills (1.11) or Mountains (0.72).

Figure 2.4 shows the trends in cultivated area of cereal and cash crops from 1996 to 2002. The area of major cereal crops changed marginally from 2,942 thousand ha in 1996 to 3,030 thousand ha in 2000 and to 3,010 thousand ha in 2002 (CBS 2004). The cultivated area of the three major cash crops oilseeds, potato, and sugarcane increased consistently from 1996 to 2002.

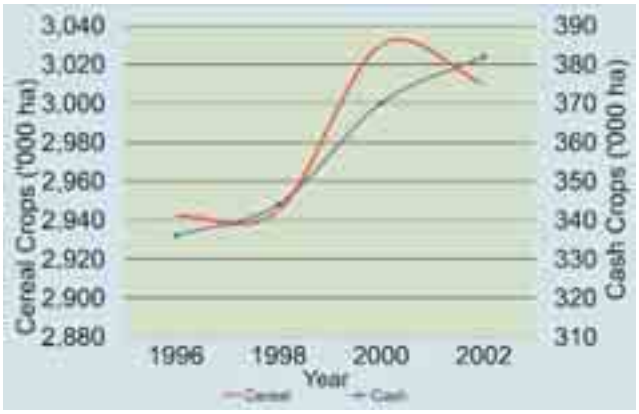
Despite increased production of crops, the country is in food deficit by 41,198 tons (Table 2.39). The Agricultural Perspective Plan estimated that 41 out of 75 districts were food deficient, with the situation in the Mountains in terms of total food requirement the worst. The livelihood groups identified as food deficient are marginal farmers (with landholdings less than 0.5 ha) in all regions; rural service providers; agricultural laborers; potters; and urban squatters. The calorie supply for Nepal is 2448 kilocalories/person/day (FAO 2004). NLSS indicates that 31% of Nepalese households have less than adequate food consumption, and 67% just adequate (CBS 2004a). Food inadequacy is much higher in rural areas (34%) than in urban areas (17%).

Table 2.38: Cultivated Area of Selected Crops by Region (ha)

Crop	Mountain		Hill		Terai		Total	
	ha	%	ha	%	ha	%	ha	%
Paddy	40,430	20.4	396,820	28.2	1,030,000	61.3	1,467,250	44.69
Wheat	42,100	21.3	239,980	17.1	289,180	17.2	571,260	17.40
Maize	57,700	29.2	535,800	38.1	160,590	9.6	754,090	22.97
Millet	25,120	12.7	138,500	9.9	13,020	0.8	176,640	5.38
Barley	10,910	5.5	15,410	1.1	3,340	0.2	29,660	0.90
Sugarcane	100	0.1	2,360	0.2	34,950	2.1	37,410	1.14
Oilseeds	1,840	0.9	28,790	2.0	123,940	7.4	154,570	4.71
Potato	19,550	9.9	47,130	3.4	18,900	1.1	85,580	2.61
Cropped Area	197,750	100.0	1,404,920	100.0	1,680,310	100.0	3,282,980	100.00
Cultivated Area	275,948		1,267,961		1,367,864		2,911,773	
Cropping Intensity	0.72		1.11		1.23		1.13	

ha = hectare
Source: CBS (2001) pp. 86–175.

Figure 2.4: Trends in Cultivated Area of Selected Crops, Nepal (1996-2002)



Source: CBS (2004)

Table 2.39: Food Production and Requirement (tons)

Region	Food Supply	Food Required	Food Balance
Mountain	152,162	277,315	(125,153)
Hill	932,331	1,112,563	(180,202)
Terai	1,843,793	1,579,636	264,157
Country	**2,928,286**	**2,969,514**	**(41,198)**

Source: CBS (2002a)

Mountain areas have the most food inadequate households (35%), followed by the Terai (34%) and Hills (28%).

There is a correlation between the level of food insecurity and the agricultural conditions of farmers in food deficit districts. The problems are most severe in remote mountainous areas where the cropping intensities and crop yields are the lowest, population of livestock per household is the highest, and the opportunities for high-value agricultural production and access to off-farm employment are most limited. The livestock on which these food-insecure people depend most heavily are low yielding due to poor health, resulting in low productivity, and high morbidity and mortality rates (NLSS 2004).

The NLSS indicates that households growing vegetables (both winter and summer) have used the largest amount of improved seeds (33%) followed by onion (18%) and potato (16%). Cereal crops are less important in terms of use of improved seeds. The percentage of agricultural households using improved seeds is less in rural areas than urban areas in all selected crops—paddy, wheat, maize, potato, onion, and vegetables. Paddy growers used the highest percentage (66%) of chemical fertilizer among other agricultural households, followed by wheat (56%), maize (34%), potato (22%), and other crops. Fertilizer use is less among agricultural households in rural areas than in urban areas (NLSS 2004).

Summary

In recent years Nepal's poverty situation has improved significantly at national, rural, and urban levels. However, poverty remains a complex and multidimensional phenomenon. Poverty is deeper, more intense, and more severe in rural areas than in urban areas as measured by parameters like adult literacy, life expectancy, population without access to safe water, and the human poverty index. Likewise, the intensity of poverty measured in terms of poverty gap and poverty severity is greater for rural areas than for urban areas. Poverty is greater among the deprived communities of rural areas.

There is a big disparity between rural and urban areas in terms of human development facilities. The HDI in rural areas is approximately 22% lower than in urban areas and the incidence of poverty 68% higher. The HEI for rural areas is 41% lower than that for urban areas. Urban areas surpass rural areas in terms of social, economic, and political dimensions of human empowerment. The low level of rural economic empowerment is due to limited access to productive assets and lack of gainful employment

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opportunities. The low level of social empowerment of rural areas is due to attributes like poor access to social infrastructure (education, health, and communication media) and income-earning opportunities. As a result of hardship and inaccessibility, and limited access to economic infrastructure, productive assets, and employment outside agriculture, Mountain areas lag behind other regions in all three dimensions of human empowerment and therefore rank among the lowest levels of economic development. The level of political empowerment is relatively better than that of social and economic empowerment, in all areas: rural or urban, and regions. However, the current level of both economic and social empowerment remains far too low to effectively address the overarching goal of poverty reduction on a sustained basis.

Rural households derive their incomes largely from agriculture through self-employment and wage employment, and they are most dependent on the agricultural sector for their livelihoods. This also suggests that opportunities for non-agricultural employment are limited in rural areas. Hill areas provide relatively better opportunities for non-agricultural employment than the Terai or the Mountains, whereas wage agricultural employment is highest in the Terai, indicating that there are significant numbers of marginal farmers or landless poor people in the Terai.

Disparities occur not only between rural and urban areas and among the regions, but also between upper and lower social classes. However, past development efforts have remained largely unsuccessful in attaining equitable and inclusive development of deprived areas and communities into the national mainstream. A major element of the Tenth Plan's poverty reduction strategy is to begin to close this gap as rapidly as possible by mainstreaming deprived communities and regions in the development process. The existing mismatch between socioeconomic and political empower-

ment also indicates a need for more balanced interventions on all three fronts of sustainable empowerment and poverty reduction.

Livelihood security comes from both economic security and environmental security. In the context of Nepal, economic security overall has improved with a decline in the level of those living below the poverty line. However, when the data are disaggregated by region and income groups, it seems that conditions regarding food security might have worsened for some. The conflict situation has worsened Nepal's overall economic situation and environmental status.

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