

2. AGRICULTURAL RESOURCE BASE AND DISTRIBUTION

2.1 Physiography and Development Regions⁶

Nepal's land area spans slightly over 147 000 sq km. It covers three distinct physiographic regions namely the mountains in the north, the hills in the middle and the *Terai* in the south, which runs along the country's border with India. The mountains and the hills occupy about 86 percent of the total land area (i.e. 43 percent each) while the *Terai* accounts for about 14 percent. Climatic conditions, land forms, soil types, natural vegetation, production potentials, social and cultural settings, ways of life, farming systems, food habits, etc. differ significantly not only among regions but also within regions due to sudden changes in altitude. As a result, many different types of microclimatic pocket areas exist even within the same district located in a particular agro-ecological and development region.

The mountain region comprises of land situated between 4 877 m and 8 848 m above sea level in the Himalayas Range and between 1 500 m and 3 000 m above sea level in the Mahabharat mountains. Climatic condition in this region varies from temperate in the low-lying Mahabharat areas to alpine in the Himalayas. About 6.4 percent of the total land area in this region is used for agriculture while only 63 percent of this is actually cultivated. Agriculture serves as the main economic activity. Cultivation is carried out mainly in areas less steep in slope and those situated in narrow valleys. The upper limit of cultivation corresponds to an elevation of about 4 200 m. This region can support only one crop of buckwheat, naked barley, wheat, barley or potatoes a year or once every two years. About 22 percent of the total land area in this region is used for grazing purpose while about 32 percent is covered by forests. Majority of the land area in this region (around 39 percent) consists of rocky terrain with snowfields and glaciers.

The hill region lies north of the Siwaliks in a belt 40 to 60 km wide running the length of country. Although the elevation ranges mainly from 800 to 2 400 m, it also includes peaks of up to 3 000 m above sea level. About 35 percent of the land in the region is used for agriculture, of which about two-thirds is cultivated. Around 58 percent land area is covered by forest and about 5 percent by grazing land. The remaining 2 percent is used for other purposes. Climate in this region ranges from subtropical in the southern Siwaliks, inner *Terai* and major river basin areas to subtemperate to temperate in the hills and high altitude areas. In this region, farming is also the main activity and this is carried out in slopes (with or without terracing), tars and valleys. Agriculture is carried out in small farms and two basic cropping systems generally prevail in this region. The first one is based on rice production on wetlands in the valleys and on terraced slopes with access to irrigation or rainwater. The second one is based on maize and millet on dry land in the hill slopes without irrigation water. Potato, meanwhile, serves as one of the main winter crops.

The *Terai*, a flat plain stretching across about 800 km, is an extension of the Indo-Gangetic plain. Elevation ranges from 60 m near the Indian border to about 300 m near the hills. The region is stretched

⁶ Drawn from AsDB, 1982.

north to south between 25 to 32 km all the way from the east to the west. About 64 percent of the land area in the region is used for agriculture, of which about 91 percent is cultivated. Forests cover about 28 percent of the land area in this region, grazing land makes up about 2 percent while the rest is used for other purposes (6 percent). Climatic condition in the region is subtropical. Although this region comprises only about 14 percent of the total land area of the country, agriculturally, this region is very important and is often called the “grain basket” of Nepal. The *Terai* is the major producer of cereal crops, cash crops, tropical fruits and vegetables. Majority of the country's arable land (54 percent) lies in this region.

For administrative and development purposes, the country has been divided into 75 administrative districts grouped into five development regions namely the EDR, the Central Development Region (CDR), the WDR, the MWDR and the FWDR. Although the average population density is 125 per sq km, density based on cultivated land is highest among countries in Asia. Less than one-sixth of Nepal's land area can be cultivated.

2.2 Land Use and Land Use Changes

Latest available data on land use of the country is presented in Table 2.1. About 18 percent of land area of the country is cultivated land. Of this area, about 10 percent can be found in the mountains, 56 percent in the hills and 34 percent in the *Terai*. Roughly 38 percent of total land area is occupied by forests distributed among the mountain (32 percent), hill (58 percent) and *Terai* (9 percent) areas. About 13 percent of the land area is devoted to grazing and pastureland, of which 79 percent are located in the mountains, 18 percent in the hills and 3 percent in the *Terai*. Land dedicated to other uses account for about 30 percent of total area, a large part of which (over 90 percent) lies in the mountains with only five percent each in the hills and the mountains.

Table 2.1: Land use, 1985

Land Use Category	Area (sq km)	Proportion (%)
Cultivable land	26 533	18.03
Forest	55 334	37.60
Pastureland	19 785	13.44
Water bodies	4 000	2.72
Others	41 529	28.21
Total	147 181	100

Source: LRMP, 1986.

Data on changes in land use are scanty. Information presented in Table 2.2 show a distinct pattern between 1975 and 1980, where the change in land use mainly involved conversion of forestland into agriculture land. Information available for 1985, which is based on Land Resources Mapping Project (LRMP) data, painted a different picture. The latest data, which is more scientific, indicate a different total land area, with relatively less land under agricultural use and more land under forest cover.

Irrespective of the figures, land use in Nepal has changed in the last two decades and this has affected land under cultivation and forest and grazing areas. Cultivated land has increased considerably at the expense of forest and pastureland. This change is also evident from the national sample census of agriculture data presented in Table 2.2.

Table 2.2: Land use in Nepal between 1981 and 1991

Land use category	(000 ha)		
	1981/82	1991/92	Change (%)
Total agriculture land	2 359.2	2 393.0	1.43
Land under temporary crops	2 250.2	2 284.6	1.53
Land under permanent crops	29.2	29.4	0.68
Other arable land	79.8	79.0	-1.00
Total non-agricultural land	104.5	204.5	95.69
Total land under private use	2 463.7	2 597.4	5.43

Source: CBS, 1994.

The table shows that total land under private holding in the second census period increased by almost 133 700 ha over the first period, or by about 5.43 percent. The increment was less in agricultural land (about 34 000 ha) than in non-agricultural land (100 000 ha).

2.3 Population, Labour Force and Employment

2.3.1 Population

Nepal had a population of 11.6 million people in 1971. The count increased to 15.0 million people in 1981 18.5 million in 1991 and 23.2 million in 2001. Although population growth in Nepal started to decline from 1981 onwards, its growth has been high compared to other nations in the region. The country's population grew at a compound rate of 2.66 per annum between 1971 and 1981, increasing annually by about 2.10 percent between 1981 and 1991 and by 2.27 percent between 1991 and 2001 (Table 2.3). Slightly over half of the total population consists of females. About 7.8 percent of Nepal's population resides in the mountains, 45.5 percent in the hills and 46.7 percent in the *Terai* region.

Table 2. 3: Population and population growth

Ecological belt	Population (millions)				Growth (%)		
	1971	1981	1991	2001	1971-81	1981-91	1991-01
Mountains	1.1	1.3	1.4	1.69	1.36	1.03	1.90
Hills	6.1	7.2	8.4	10.25	1.67	1.63	2.01
<i>Terai</i>	4.3	6.6	8.6	11.21	4.2	2.78	2.69
Nepal	11.6	15	18.5	23.15	2.66	2.10	2.27

Source: CBS, 1996 and 2002.

Population growth has been highest in the *Terai* (2.69 percent) followed by the hill (2.01 percent) and mountain (1.90 percent) areas. This indicates the effect of reduced but continued migration of people from the hilly and mountainous areas to the *Terai* and the relatively faster growth of urbanization in the *Terai* region facilitated by its flat terrain and better infrastructure. In terms of development region, 23 percent of the population lives in the EDR, 35 percent in the CDR, 20 percent in WDR, 13 percent in MWDR and 9 percent in FWDR. An interesting albeit alarming finding is that almost 50 percent of the population were below 20 years of age in 1981, 1991 and 2001, sending a strong signal that population growth may still be higher in future.

The population structure of the country at different census points is presented in Table 2.4. People aged 15 years and below made up about 40.5 percent of the total population in 1971, 41.35 percent in 1981, 42.4 percent in 1991 and 39.4 percent in 2001. The fact that almost 40 percent of the country's population constitutes young people indicates that the population growth rate will possibly remain high in the future. The proportion of the youth in the country's population is similar in all the census points across genders with males slightly outnumbering females except in 1971 when females slightly outnumbered males.

Table 2.4: Population structure of Nepal at different census points

Age group	1971	1981	1991	2001
	Population (millions)			
0-4 years	1.63	2.31	2.71	2.76
5-14 Years	3.04	3.90	5.13	6.19
15-59 Years	6.23	7.95	9.58	12.31
60 + years	0.65	0.86	1.07	1.48
Total	11.56	15.02	18.49	22.74
% < 15 years	40.45	41.35	42.40	39.35

Source: CES, 1998 and CBS 2002.

2.3.2 Labour force and employment

The labour force, defined as those 10 years of age and above, numbered about 8.2 million in 1971 (about 70 percent of population), 10.5 million (about 70 percent of population) in 1981, 12.7 million (68.8 percent of population) people in 1991 and 15.3 million (67.1 percent of population) in 2001 (Table 2.5). Except for 1981, the labour force comprises more females than in males.

Table 2.5: Potential and actual labour force and participation rate by sex

Particulars	Sex	Numbers (millions)			Participation rate (%)
		Population	Labour force	Workforce	
1971	M	5.8	4.1	3.4	82.9
	F	5.7	4.1	1.4	35.1
	T	11.6	8.2	4.8	59.3
1981	M	7.7	5.4	4.5	83.1
	F	7.3	5.1	2.3	46.2
	T	15	10.5	6.8	65.1
1991	M	9.2	6.2	4.3	68.7
	F	9.3	6.5	3.0	45.5
	T	18.5	12.7	7.3	57.0
2001	M	11.4	7.6	6.2	81.8
	F	11.4	7.7	6.9	90.2
	T	22.8	15.3	13.1	85.8

Source: NHDR, 1998 and CBS, 1999 and CBS, 2002.

Note: Participation rate is adopted from CBS, 1999.

The workforce, defined as comprising those actually working or available for work in the seven days prior to the time of survey, comprised about 4.8 million people in 1971, with the count increasing to 6.8 million people in 1981, 7.3 million people in 1991 and 13.1 million people in 2001. This implies a participation rate of about 59.3 percent in 1971, 65.1 percent in 1981, 57 percent in 1991 and 85.8 percent in 2001. In terms of gender, participation rate had been lower for women than men in previous years except in 2001. This is because a large part of women's work was not classified as productive activity in the census prior to 2001. The increase in the participation rate of women in the succeeding period (from 35.1 percent in 1971 to 90.2 percent in 2001) indicates that women's work is increasingly being recognized as valuable to society.

The labour force participation rate varied across ecological belts. Information presented in Table 2.6 shows that participation was highest in the mountains followed respectively by the hills and the *Terai*. The latter had the lowest participation rate due to low female participation rate that traced to religious and social norms, which bars women from working outside the households. However, the growing trend is that the women are now coming out of households and more of their work is being recognized as productive.

Table 2.6: Changes in labour force participation rate over time, by ecological region (%)

Regions	1971	1981	1991	1996	2001*
Mountains	70.0	75.7	74.5	81.5	NA
Hills	62.9	68.8	62.8	70.5	NA
<i>Terai</i>	51.3	58.8	48.6	69.0	NA
Nepal	59.3	65.1	57.0	70.6	85.8

Source: NHDR, 1998 and CBS, 1999

* Adopted from CBS, 1999.

Table 2.7 presents the distribution of workers by major work area in 1981, 1991 and 1996. The information shows agriculture as having the highest workforce participation rate of about 91.1 percent in 1981, 81.2 percent in 1991 and 82.9 percent in 1996. The predominance of the agriculture sector in terms of providing jobs indicates agriculture development as the prime area to be targeted in poverty reduction policy.

Table 2.7: Work participation by major sector

Sectors	1981	1991	1996
Agriculture, forestry & fishery	91.13	81.23	82.9
Non-agriculture	8.87	18.77	17.1
Total	100.00	100.00	100.00
Distribution of non-agriculture			
Trade and commerce	18.09	18.58	NA
Personal community service	51.64	54.57	NA
Other sectors	30.26	26.85	NA

Source: CBS, 1995 and CBS, 1996.

About 8.9 percent of workforce had been engaged in the non-agriculture sector in 1981, 18.8 percent in 1991 and 17.1 percent in 1996. This comprised several sectors, mainly, mining and quarrying, manufacturing, electricity, gas and water, construction, trade and commerce, transport and communication, finance and business services and personal community work. Among these, trade and commerce and personal communication services were important in terms of absorbing the workforce. These two accounted for about 18.1 percent and 51.6 percent of the non-agriculture workforce in 1981 and 18.6 percent and 54.6 percent, respectively, in 1991.

2.3.3 Unemployment and underemployment

An unemployed person is defined as one who is 10 years of age or above, currently not working at least one day in a year or one hour in a week, but who seeks work or is available for work and is not a student or household worker physically unable to work. Because of the very narrow definition adopted, unemployment rates estimated appear rather low. Estimates of unemployment rates for different time

periods are presented in Table 2.8. Information presented in the table show that about 5.6 percent of workforce were unemployed in 1976/77. This seems to have decreased to about 3.1 percent in 1984/85 and increased to 4.9 percent in 1995/96.

Table 2.8: Estimates of unemployment rate at different points in time

Sex	Year			
	1976/77	1984/85	1995/96	1998/99
Male	5.5	na	5.6	2.0
Female	6.0	na	4.1	1.7
Total	5.6	3.1	4.9	1.8

Source: NPC, 1977; Ghayur. 1994; and CBS, 1996 and 1999.

The unemployment rate reported by the Nepal Labour Force Survey 1998/99 (NLFS) appears rather low (1.8 percent). This is because it considered employment of people 15 years and above as opposed to the previous two surveys which considered people above 10 years as part the labour force. Unemployment was higher among the males than in females in 1976/77, but these were consistently lower in subsequent periods.

Although unemployment rates were lower, there existed a quite high rate of underemployment due mainly to the very narrow definition of unemployment. An active person in the labour force is said to be underemployed if he/she does not work for 40 hours a week. Table 2.9 shows the estimates of underemployment at different points in time.

Table 2.9: Underemployment rate at different points in time by region

Region	1976/77	1984/85	1995/96	1998/99
All Nepal*	60.9	44.9	47.0	27.4**
Rural	63.1	46.4	47.5	NA
Urban	44.7	33.6	38.1	
Mountains	NA		36.5	
Hills			45.1	
Terai			50.8	

* National figures computed using weights of labour force.

** Number of employed persons working less than 40 hours per week.

Source: NHDR, 1998 and CBS, 1999.

Information presented in the table show that the rate of underemployment was about 61 percent in 1976/77. This reduced to about 47 percent in 1995/96. Underemployment was more rampant in rural areas compared to urban areas due to the seasonal nature of agriculture, which is the prime source of employment in rural areas. By ecological belts, it is lowest in the mountains (36.5 percent) and highest in the Terai (50.8 percent).

2.3.4 Labour productivity

The change in labour productivity over time has been interpreted based on two parameters. First, it has been interpreted as the ratio of real GDP to the labour force (population aged 10 and above) and as the ratio of real GDP to the workforce. Second, it has been interpreted as movements of real wage rates.

In Table 2.10, the first measure of labour productivity is presented. Real GDP per member of the labour force increased from about Rs 4 706 in 1991 to Rs 5 190 in 1996 and Rs 5 305 in 2001 implying an annual growth rate of 1.98 percent between 1991 and 1996 and 0.44 percent between 1996 and 2001.

Table 2.10: Changes in labour productivity

Year	Particulars	No of persons (millions)	GDP (million Rs, 84/85 prices)	Productivity (Rs/person)	Annual growth (%) between two consequent times		
					Labour	Real GDP	Productivity
1991	Pop'n 10 yrs and above	12.7	59 768	4 706.1	NA		
	Workforce	7.3	59 768	8 187.4			
1996	Pop'n 10 yrs and above	14.6	75 773	5 189.9	2.83	4.86	1.98
	Workforce	10.3	75 773	7 356.6	7.13	4.86	-2.12
2001	Pop'n 10 yrs and above	18.4	97 620	5 305.4	4.74	5.20	0.44
	Workforce	15.8	97 620	6 178.5	8.93	5.20	-3.43

Source: Computed from information presented in the Economic Survey Report 1999/2000 and 2000/01 and 2002/01, MOF.

Looking at the workforce (i.e. the currently active labour force or labour force employed), productivity visibly declined from about Rs 7 357 per worker in 1996 and to Rs 6 179 in 2001. This implies an annual growth of -2.12 percent between 1991 and 1996 and of -3.43 percent between 1996 and 2001. Decline in labour productivity in 1996 compared to 1991 and in 2001 compared to 1996 stems from differences in the annual growth of the workforce and real GDP. During the period, GDP grew by about 4.86 percent and 5.20 percent in 1996 and 2001, respectively, while the workforce correspondingly increased by 7.13 percent and 8.93 percent, resulting in lower labour productivity in the latter period.

Labour productivity is also reflected by the real wage rate in the different sectors. Levels of and trends in real wages of unskilled labourers in different sectors including the civil service is presented in Table 2.11: Although annual growth in real wage has been modest in all the sectors (except for agriculture where the rate is negative), real wages have remained quite low in Nepal.

Table 2.11: Levels and trends in real wages by sector
(Rs/month for unskilled labour, 1985 prices)

Real wage by industrial activity*	Year					Growth rate (%)
	1985	1990	1994	1995	1996	
Kathmandu						
Agriculture	636	657	658	739	795	2.05
Industry	313	280	360	421	412	2.53
Labour**	–	631	775	783	852	5.13
Biratnager						
Agriculture	523	478	506	472	444	-1.48
Industry	301	304	431	507	381	2.17
Labour**	–	478	619	629	592	3.63
	1985	1991	1994	1995	1996	
RW in civil service						
Peon	410	469	Na	404	441	0.66
Junior clerk	545	580	Na	495	520	-0.43
Clerk	650	654	Na	569	583	-0.98
Senior clerk	815	770	Na	697	694	-1.45

* Nominal wage in Kathmandu and Biratnagar deflated by respective area consumer price indices.

** Other unorganized labour sectors.

Source: NHDR, 1998.

In 1985, the monthly wage rate in agriculture stood at Rs 636 in Kathmandu and Rs 523 in Biratnagar. In Kathmandu, this rate increased to Rs 657 in 1990, Rs 658 in 1994, Rs 739 in 1995 and Rs 795 in 1996 registering an annual growth rate of 2.05 percent. However in Biratnagar, this rate gradually declined and reached Rs 444 in 1996, implying an annual decline of about 1.48 percent.

The real wage rate, meanwhile, has fluctuated in the industrial sector. In Kathmandu, it declined from Rs 313 per month in 1985 to Rs 280 in 1990, increasing to Rs 360 in 1994 and Rs 421 in 1995 and Rs 412 in 1996, or an annual growth rate of about 2.53 percent. However, the industrial sector real wage rate estimated at Rs 301 per month in Biratnagar increased consistently until 1995, when it reached Rs 507, and then subsequently declined to Rs 381 in 1996. Between 1985 and 1996, the annual increase in real wage was about 2.17 percent.

The real wage rate in the informal sector, however, has been increasing consistently both in Kathmandu and Biratnagar. In Kathmandu, it increased from Rs 631 per month in 1990 to Rs 852 in 1996, or equivalent to an average annual growth of 5.13 percent. However, in Biratnagar, the increasing trend was observed only up to 1995. The real wage rate, which increased from Rs 478 per month in 1990 to Rs 629 in 1995, declined to Rs 592 in 1996. Between 1990 and 1996, the real wage increase per annum was 3.63 percent.

In the civil service sector, the real wage of junior level staff has not only been low and less than sufficient to meet daily requirements but it also has not been growing. Except for peons, whose real wages have been increasing annually by about 0.66 percent, real wages have declined for clerks.

The high rate of inflation, which averaged at around 10.5 percent in the last decade, and the slow growth in the nominal wage has contributed to the slow growth in real wages.

2.4 Landholding and Holding Size

2.4.1 Households, farm size and size distribution

The 1981 sample census of agriculture indicated a total of 2 194 000 households⁷ with 2 463 700 ha of land under household possession, indicating an average possession of about 1.13 ha per household (Table 2.12). Of this, about 96 percent was for agriculture use and 4 percent for non-agriculture use. The number of holdings rose to 2 736 000 in 1991 while land under household possession increased to 2 597 400 ha, a change of roughly 24.7 percent and 5.43 percent, respectively, resulting in a reduction of the average land size under household possession. In 1991, an average household possessed only 0.96 ha of land, of which 93 percent was used for agriculture and 7 percent for non-agriculture.

Table 2.12: Land use in Nepal between 1981 and 1991

Particulars	1981/82	1991/92	% Change
Total agriculture land (000 ha)	2 359.2	2 393.0	1.43
Total non-agricultural land	104.5	204.5	95.69
Total landholding	2 463.7	2 597.4	5.43
Total holdings	2 194.0	2 736.0	24.70
Holdings w/o land	8.3	32.1	286.75
Holdings w/ land	2 185.7	2 703.9	23.71
Average size of holding (ha)	1.13	0.96	-14.78
Agriculture holding	1.08	0.89	-18.01
Non-agriculture holding	0.05	0.08	58.19
Average Family Size (no)	5.86	5.94	1.4

Source: CBS, 1994.

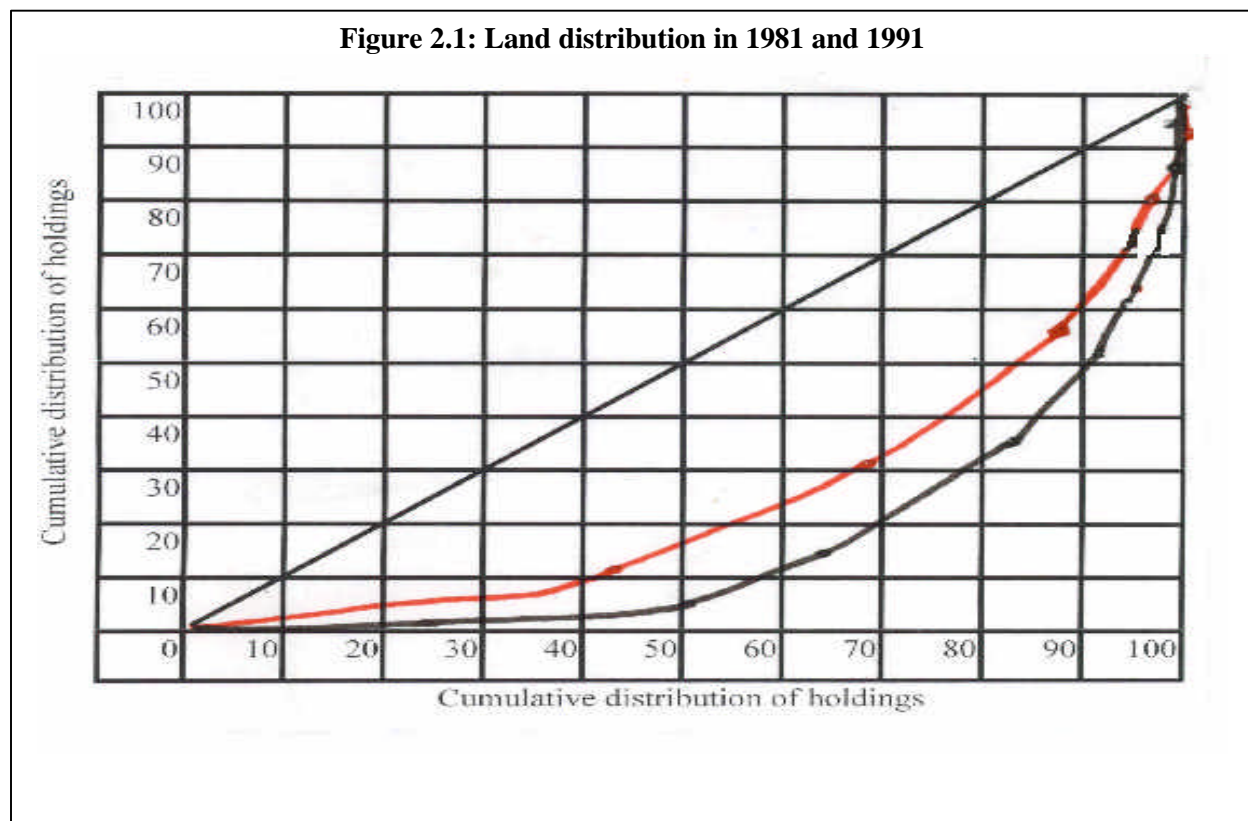
As shown in Appendix Table 1, the average size of landholdings decreased from the Terai (1.26 ha) to the hill (0.77 ha) and the mountain (0.68 ha) areas. Average family size of landholders increased slightly from 5.86 persons in 1981 to 5.94 persons in 1991. Population density between two census periods increased by almost 19 percent⁸ indicating growing population pressure on land under holders' possession.

⁷ Less than one percent of holdings were landless in 1981, which increased to 1.2 percent in 1991.

⁸ Calculated as percentage in the ratio of number of persons per holder to holding size in the two periods.

Another characteristic feature of demographic and land use changes in Nepal is the skewed distribution in favour of big landholders. Figure 2.1 shows land distribution in the two census periods. In 1981, 50 percent of households each operated less than 0.5 ha and collectively possessed only about 7 percent of land while the last ten percent of households each possessed three hectares and above or nearly 48 percent of the land in total. Although land distribution seems to have improved slightly in the 1990s, distribution remains highly skewed in favour of large holders. In 1991, around 43 percent of holders possessed less than 0.5 ha of land and accounted for almost 11 percent of the total area while the proportion of land held by the last 10 percent possessing around 3 ha amounted to about 42 percent of the land.

Figure 2.1: Land distribution in 1981 and 1991



Census Period	Range	< 0.5 ha	< 1.0 ha	< 2.0 ha	< 3.0 ha	< 4.0 ha	< 5.0 ha	< 10 ha	> 10 ha
		% of land	7	17	37	53	63	71	87
1981/82	% of holding	50	67	84	91	95	97	99	100
	% of holding	43	69	89	95	98	99	100	100
1991/92	% of holding	43	69	89	95	98	99	100	100
	% of land	11	31	58	74	81	86	94	100

Source: CBS, 1994

2.4.2 Access to irrigation

The proportion of holders with access to irrigation in 1981 and 1991 is presented in Table 2.13 along with the average size of irrigated land per holder. Ecological details are provided in Appendix Table 2. Access to irrigation to landholders increased from 38.6 percent in 1981 to about 51 percent in 1991 while the proportion of irrigated area grew from about 24 percent to 34 percent. Figures in the table imply that almost half of the total number of holdings had no access to irrigation in 1991. With the increase in both the proportion of irrigated holdings and area irrigated, the average size of irrigated holdings rose from about 0.24 ha to 0.33 ha⁹.

Table 2.13: Access of landholders to irrigation

Particulars	1981/82	1991/92
Proportion of holders with access to irrigation	38.6	50.9
Proportion of area irrigated	23.7	34.0
Average size of irrigated holding (ha)	0.24	0.33

Source: NSCA 1991/92 Highlights, CBS, 1994.

2.5 Production and Productivity of Crops

2.5.1 Area, production and yield of food and cash crops

Paddy, maize, wheat, millet and barley are the major food crops grown in Nepal while sugarcane, a variety of oilseeds, tobacco and jute are the major cash crops. Potatoes, pulses and other food crops are also grown in sizable amounts. Table 2.14 summarizes the trend for major food crops and cash crops in terms of area covered as well as intensity of land use. Crop-specific details are presented in Appendix Table 3. Between 1990/91 and 1996/97, area under food crops grew annually by 1.24 percent (to 3 267 in 1996/97) and by 0.35 percent annually between 1996/97 and 2000/01 (to 3 314 000 ha in 2000/02).

⁹ Refers to total number of holdings.

Table 2.14: Trends in crop area

Particulars	Unit	1990/91	1996/97	2000/01	Growth rate	
Food crops	000 ha	3 034	3 267	3 314	1.24	0.35
Pulses	000 ha	268	312	306	2.60	-0.49
Potato	000 ha	84	111	129	4.68	3.87
Cash crops	000 ha	213	247	265	2.56	1.68
Vegetables	000 ha	141	147	157	0.70	1.77
Total cropped area	000 ha	3 739	4 084	4 171	1.48	0.52
Cropping intensity	%	1.54	1.60	1.64	0.59	0.69
Cultivated area	000 ha	2 420	2 553	2 536	0.89	-0.16

Source: CBS, 1999 and SINA, MOAC, 1994/95 to 2000/01.

In the case of pulses, the area covered expanded by about 2.60 percent annually between 1990/91 and 1996/97 but declined by about -0.49 percent between 1996.97 and 2000/01. In the case of potatoes, however, the area increased consistently in the 1990s. Area under this crop grew at about 4.68 percent per annum between 1990/91 and 1996/97 and by about 3.87 percent between 1996/97 and 2000/01. The area planted to cash crops similarly registered annual growth rates of 2.56 percent and 1.68 percent in the same two periods. While part of the increase came from the extension of cultivation to marginal lands, most of the growth was the effect of expansions in irrigated area facilitating multiple cropping. In the periods reviewed, cropping intensity grew from about 154 percent in 1990/91 to 164 percent in 2000/01.

Data on the production of food as well as cash crops are presented in Table 2.15. Further details can be found in Appendix Table 4. Food crop production in the country increased from about 5 828 600 mt in 1990/91 to about 6 426 600 mt in 1996/97 and 7 171 800 mt in 2000/01 registering an annual growth of 1.64 percent and 2.78 percent, respectively, in the two periods. Production of pulses also increased from 161 100 mt in 1990/91 to 223 000 mt in 1996/97 and 243 200 mt in 2000/01. This implies an annual growth of pulse production equivalent to 5.5 percent and 2.2 percent in the corresponding time periods. Likewise, potato production increased from about 738 000 mt in 1991 to 997 400 mt in 1996/97 and to 1 313 700 mt in 2000/01, indicating an annual growth rate of 5.2 percent and 7.1 percent, respectively.

Table 2.15: Trends in crop production

Particulars	Unit	1990/91	1996/97	2000/01	Growth rate (%)	
Food Crops	000 mt	5 828.6	6 425.6	7 171.8	1.64	2.78
Pulses	000 mt	161.3	223.0	243.2	5.54	2.20
Potato	000 mt	738.0	997.4	1 313.7	5.15	7.13
Cash crops	000 mt	1 222.6	1 768.6	2 364.9	6.35	7.53
Vegetables	000 mt	1 127.9	1 357.4	1 653.0	3.14	5.05

Source: CBS, 1999 and SINA, MOAC, 1994/95 to 2000/01.

Growth in the production of cash crops has also been remarkable, ranging from to 6 to 8 percent per annum in the two comparative periods. A large part of the growth can be attributed to sugarcane production, which increased from 1.1 million mt in 1991 to 1.6 million mt in 1996/97 and to almost 2.2 million mt in 2000/01. Growth in the production of food and cash crops owes to an expansion in area and yield.

The trends in crop yield growth are summarized in Table 2.16 while crop- and region-specific details are outlined in Appendix Table 5. Growth in food crop yields has apparently been marginal (0.39 percent) between 1990/91 and 1996/97 and modest between 1996/97 and 2000/01 (2.42 percent).

Table 2.16: Crop yield trends

Crops	1990/91	1996/97	2000/01	Growth rate (%)	
				1990/91-1996/97	1996/97-2000/01
Food Crops	1.92	1.97	2.16	0.39	2.42
Pulses	0.60	0.71	0.79	2.87	2.70
Potato	8.76	9.00	10.18	0.45	3.14
Cash crops	5.75	7.15	9.93	3.69	8.58
Vegetables	8.03	9.27	10.52	2.42	3.22

Source: CBS, 1999 and SINA, MOAC, 1994/95 to 2000/01.

Low growth in food crop yield in the first period is a result of slow growth in paddy yield coupled by negative growth in millet partly due to erratic monsoon rains. A similar trend has been observed in the yield growth of potato and cash crops. The annual growth rate of potato yield was 0.45 percent during the first period, increasing to 3.14 percent in the latter period. Pulses and cash crop yield generally remained modest in both periods. Vegetable production showed consistent improvement in both periods.

To assess yield performance of major crops in the country vis-à-vis its neighbors, the three-year average yield of Nepal's major crops in the early 1960s is compared with that of the late 1990s. The figures are presented in Table 2.17. The numbers show that the country's crop yield in the early 1960s was found to be 198 percent higher than in India, 111 percent higher than in Bangladesh, 212 percent higher than in Pakistan and 108 percent higher than in Sri Lanka. However, the situation reversed in the late 1990s with Nepal having the lowest crop yield. During the latter period, crop yield in Nepal amounted to only 46.7 percent of India, 87 percent of that in Bangladesh, 46.3 percent of that in Pakistan and 64.9 percent of that in Sri Lanka. This shows that Nepal has lagged behind its neighbors in terms of crop sector performance.

Table 2.17: Per hectare yield and growth rates of major crops in Nepal and other Asian countries, 1961 to 1999

Yield countries	1961-63				1997-99			
	Paddy	Wheat	Sugar	All	Paddy	Wheat	Sugar	All
Nepal yield (kg/ha)	1 940	1 230	1 979	1 854	2 410.0	1 630.0	3 597.0	2 940.00
Nepal yield as % of								
India	129	146	46	198	83.05	63.17	53.68	46.71
Bangladesh	116	198	53	111	85.81	74.43	84.92	87.05
Pakistan	140	150	61	212	84.38	75.78	74.68	46.32
Sri Lanka	101	na	119	108	74.29	Na	66.02	64.91
Yield Growth Rates (%)	Not Applicable				1961-63 to 1997-99			
Nepal					0.59	0.76	1.63	1.25
India					1.79	3.07	1.20	5.28
Bangladesh					1.41	3.46	0.34	1.92
Pakistan					1.97	2.64	1.07	5.50
Sri Lanka					1.43	Na	3.26	2.66

Source: Panday, 1999 and computed from information provided in SINA, MOAC, 1999.

2.5.2 Area, production and yield of horticultural crops

Fruits and vegetables are the principal horticultural crops of Nepal. Table 2.18 presents the trends in the country in terms of area, production and yield of fruits and vegetables between 1993/94 and 2000/01. The area planted to fruit crops increased from about 38 000 ha in 1993/94 to about 48 000 ha in 2000/01, which translates to an annual growth of 3.71 per cent between 1993/94 and 1996/97 and 3.31 percent between 1996/97 and 2000/01. Fruit production correspondingly rose by 4.25 and 3.28 percent, indicating annual growth of 0.53 per cent in the first period and a -0.02 percent decline in the second period.

Table 2.18: Trends in area, production and yield of horticultural crops

Particulars	Year			Growth rate (%)	
	1993/94	1996/97	2000/01	93/94-96/97	96/97-2000/01
Area (000 ha)					
Total fruit area	56	63	74	3.84	4.06
Fruit productive area	38	42	48	3.71	3.31
Vegetables	141	147	157	1.40	1.77
Production (000 mt)					
Fruits	378	428	487	4.25	3.28
Vegetables	1 197	1 357	1 653	4.27	5.05
Yield (mt/ha)					
Fruits	9.97	10.13	10.12	0.53	-0.02
Vegetables	8.52	9.27	10.52	2.82	3.22

Source: SINA, MOAC, 2000/01.

Much of the growth in fruit yield and area coverage traces to the production of citrus which recorded an annual growth of about 6 percent and 7 percent in the two periods under study. Likewise, the area planted to vegetables grew annually by 1.40 and 1.77 percent, respectively, while production correspondingly grew by 4.27 percent and 5.05 percent, indicating yield growth of 2.82 percent and 3.22 percent.

2.5.3 Livestock population growth and changes in livestock holding¹⁰

The livestock population of Nepal, particularly of ruminants, is considered the highest in the world in view of its size. Table 2.19 highlights the trends in livestock population with species details presented in Appendix Table 6. The population of ruminants increased from 15.6 million heads in 1990/91 to 17.2 million heads in 1996/97 and further to 17.9 million heads in 2000/01. This translates to an annual growth in ruminant population of 1.65 percent between 1990/91 and 1996/97 and of 1.08 percent between 1996/97 and 2000/01.

Table 2.19: Livestock population trends

Livestock group	Total population (000)			Annual growth (%)	
	1990/91	1996/97	2000/01	90/91-96/97	96/97-00/01
Ruminants	15 572	17 179	17 935	1.65	1.08
Pigs	592	724	913	3.41	5.97
Fowl	13 951	15 993	20 201	2.30	6.01

Source: SINA, MOAC, 2000/01.

Note: Ruminants include cattle, buffalo, sheep and goat.

The pig population, which stood at 592 000 heads in 1990/91, grew annually by about 3.41 percent between 1990/91 and 1996/97 and by 5.97 percent between 1996/97 and 2000/01, reaching 913 000 heads in 2000/01. Similarly, growth of fowls, the majority of which comprises chicken, remained at 2.3 percent during the first period while rising to 6.01 percent during the second period. The high growth rate of pigs and fowls is a result of rapid urbanization and commercialization of the livestock sector.

Table 2.20 summarizes the information pertaining to trends in livestock holding. The data show that the proportion of households maintaining livestock increased from 1981 to 1991¹¹. The proportion of those keeping ruminants, in particular, increased from 134 percent in 1981 to 178 percent in 1991. This denotes not only more holders but also indicates the practice of keeping more than one species of ruminants. The proportion of holders who kept pigs and fowls increased from 7 percent and 40 percent, respectively, in 1981 to 10 percent and 62 percent in 1991. It is also observed that the average number of ruminants held decreased from 4.58 livestock units in 1981 to 4.41 in 1991 and then to 4.22 in 2000/01,

¹⁰ Ruminant population data are expressed in Livestock Standard Units (LSUs) and computed using the following conversion factors: cattle and chauris=1, buffalo=1.1 and goats and sheep=0.2 (DFAMS, 1986).

¹¹ The proportion of holders with livestock is defined as the percentage of total households reporting rearing some species of livestock.

revealing a growing tendency to reduce the number of large and unproductive animals to be able to cope with a smaller feed base. The number of pigs decreased from 0.20 per holding in 1981 to 0.18 in 1991, increasing to 0.27 in 2001. In the case of fowls, the average number of birds per holding remained on the rise (i.e. from 3.8 birds per holding in 1981 to 6.00 in 2001).

Table 2.20: Proportion of households with livestock and average size of livestock holdings

Particulars	Year			Growth rate (%)	
	1981/82	1991/92	2000/01	1981-91	1991-2001
Proportion of holders with livestock (%) *					
Ruminants	134	178	NA	2.88	NA
Pigs	7	10	NA	3.63	
Fowls	40	62	NA	4.48	
Average number of livestock / holding **					
Ruminants	4.58	4.41	4.22	-0.38	-0.44
Pigs	0.20	0.18	0.27	-1.05	4.13
Fowls	3.80	4.13	6.00	0.84	3.81

* The percentage exceeds 100 due to multiple counting of households.

** For 2000/01 figures, population is divided by total agricultural households.

Source: NSCA, 1981 and 1991 and SINA, MOAC-2000/01.

2.6 Pattern of Use and Level of Modern Inputs

Improved seeds, chemical fertilizers and agrochemicals are the modern inputs often used in the agriculture sector. Although use of such inputs has been on the rise, coverage in terms of holdings and use levels are far below those of neighboring countries. Changes through time in the proportion of holders using modern inputs on crops have been presented in Table 2.21. These are applied in the production of cereals such as paddy, maize and wheat and of cash crops such as potato and sugarcane¹². Between 1981 and 1991, the proportion of holders using improved seeds increased for the crops, reaching 24 percent for paddy, 31 percent for wheat, 12 percent for maize, 18 percent for potato and 32 percent for sugarcane. These proportions have increased further in recent years.

¹² Although data are not available, modern inputs are also used in oilseeds, pulses and vegetables.

Table 2.21: Proportion of holders using modern inputs on crops

Crop holdings	Proportion using improved seeds (%)		Proportion using PP chemicals (%)		Proportion using fertilizers (%)	
	1981	1991	1981	1991	1981	1991
Paddy	3.2	24.0	0.8	13.2	16.0	48.8
Wheat	4.8	30.7	1.0	5.4	26.9	52.4
Maize	2.4	11.9	0.9	2.8	5.1	22.6
Potato	1.0	17.9	0.5	10.7	7.7	30.5
Sugarcane	3.0	31.8	0.4	23.5	14.3	71.2
Holding (000)	2 186	2 704				

Source: NSCA-1991, Highlights, CBS 1994.

Users of plant protection chemicals also increased in 1991 compared to 1981 but none of the users had growth exceeding 24 percent. Changes in the use of chemical fertilizers, on the other hand, have been remarkable. As in the case of improved seeds, users of fertilizers increased for all crops in 1991 compared to 1981 and reached almost 49 percent for paddy, 52 percent for wheat, 23 percent for maize, 31 percent for potato and 71 percent for sugarcane. Use of improved seeds by farmers in paddy, wheat, maize and potato production reported to have increased to 35 percent, 40 percent, 24 percent and 48 percent, respectively, in 2000/01 (ASPR, 2002). The proportion of farmers using chemical fertilizers on crops is estimated at around 90 percent during the period (MOAC, 2003 forth coming).

The increase in the proportion of holders applying fertilizers on crops in recent years has also been accompanied by a rise in total fertilizer consumption and fertilizer consumption per hectare of cropped area (Table 2.22). Cropped area increased by 1.62 percent annually between 1984/85 and 1996/97 (reaching 3.6 million ha in 1996/97) and by 0.10 percent between 1997/98 and 2000/01 (reaching 3.7 million ha in 2000/01). During the same period, fertilizer consumption increased from about 43 000 mt of nutrients in 1984/85 to about 64 000 mt in 1996/97 and to 74 000 mt in 2000/01 indicating an annual increment of about 4.42 percent during the first period and by 3.58 percent during the second period. Fertilizer nutrient consumption per ha of cropped area, which averaged at about 15.7 kg/ha in 1984/85, increased to 17.7 kg/ha in 1996/97 and 19.9 kg/ha in 2000/01, indicating an annual growth rate of 0.99 percent in the former period and 2.95 percent in the latter.

Table 2.22: Fertilizer consumption and per hectare use

Fiscal year	Cultivated area (million ha)	Cropped area (million ha)	Fertilizer nutrient consumption		
			Total (000 mt)	Cultivated area	Cropped area (kg/ha)
1984/85	2.11	2.72	42 829	20.29	15.74
1996/97	2.56	3.62	64 150	25.06	17.72
2000/01	2.57	3.71	73 855	28.74	19.91
Growth rate (%)		0.82			
1994/85-1996/97	1.62	2.40	3.42	1.77	0.99
1996/97-2000/01	0.10	0.62	3.58	3.48	2.95

Note: Cultivated area estimated based on area of crops grown in summer and cropped area is the sum of areas under cereal and cash crops reported in SINA, 2002, MOAC.

Source: MOAC, 2002 and Fertilizer Unit, MOAC, 2002.

2.7 Food Security Status

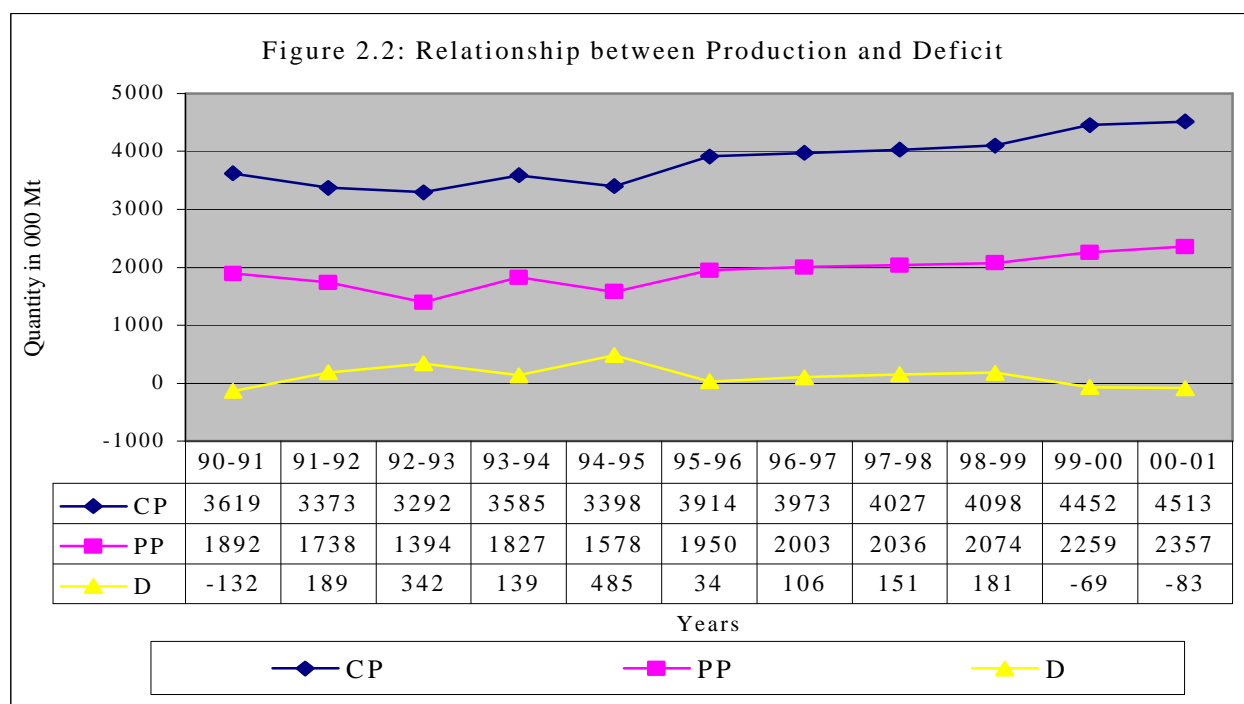
Food security has been understood in different forms and very often it has been defined narrowly to mean food self-sufficiency. In this context, food security implies that the nation produces enough food to feed its entire population. However, there is no guarantee that the country will be able to do so simply because it produces enough food. People, especially the poor, will have no access or capacity to buy food even with plentiful supply at the national level. Also, the available food for some may not be sufficient to lead a healthy and productive life. Therefore, one can think of other dimensions of food security besides food self-sufficiency.

In this context, the FAO's definition of food security is worth mentioning. It defined food security as a state "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for leading an active and healthy life"¹³. This definition encompasses several dimensions of food security. First, it implies both physical and economic access to sufficient food. Second, it means that such access should encompass all people irrespective of their economic and social backgrounds. Third, this should hold at any time of the year, even in times of unusual events such as wars and natural calamities. Fourth, it implies that food must be safe and nutritious enough to lead healthy life. Of the several dimensions of food security, physical access to nutritious food is a direct concern of the agriculture sector. In the following two subsections, an attempt has been made to assess food security situation from the perspective of agriculture sector performance.

¹³ Rome Declaration on World Food Security and the World Food Summit Plan of Action 1996.

2.7.1 Food production and availability

Nepal used to be a food surplus country and a food exporter until the 1970s. However, due to failure of the food sector to grow at par with population, it started experiencing food deficits in the 1980s and has now turned into a regular importer of food. Table 2.23 presents the food self-sufficiency situation of the country in the 1990s, when the country suffered from food deficits in seven out of ten years.



The country's food deficit, which stood at about 189 000 mt (5.31 percent of the requirement) in 1991/92, increased to about 485 000 mt (12.5 percent of requirement) in 1994/95 with a small decline in 1993/94. In 1995/96, the gap declined sharply to about 31 000 mt. However, it again picked up pace, reaching 181 000 mt in 1997/98. In the last two years of the twenty-first century, the deficit turned into a surplus of about 83 000 mt in 2000/01. With the steady growth in population (and hence also in requirements), annual fluctuations in the food deficit situation at the macro level has been directly determined by variations in production that in turn are determined by variations in the production of paddy¹⁴. Although the deficit defined as a percentage of requirements never exceeded 13 percent at the macro level, many variations have been observed in the indicator across regions and ecological belts.

As mentioned earlier, the country experienced food deficits (i.e. production less than requirement) in seven out of ten years in the 1990s. The deficit was lowest at less than 1 percent of requirement in 1995/96 and modest at around 4 percent of requirements in 1997/98.

¹⁴ As expected cereal production and food deficit are negatively correlated (Corr Coeff = -0.64), cereal production is highly and positively correlated (Corr Coeff = 0.95) and thus food deficit is highly correlated negatively with paddy production (Corr Coeff = 0.76).

Table 2.23: Food deficit situation by regions and ecological belts

Ecological Belt	No of deficit districts			Percentage deficit		
	1995/96	1997/98	2000/01	1995/96	1997/98	2000/01
EDR	9	6	2	15.88	12.96	24.20
CDR	14	13	11	-9.59	-10.05	-10.03
WDR	12	11	7	1.05	-9.62	5.47
MWDR	13	9	9	-4.56	-2.82	1.38
FWDR	7	7	7	-10.38	-10.21	-16.75
Nepal	55	46	36	-0.87	-3.61	1.90
Mountains	16	16	14	-38.87	-37.3	-24.39
Hills	33	26	21	-14.88	-17.33	-16.13
<i>Terai</i>	6	4	2	19.66	16.44	24.64

Note: Positive sign in the last two columns indicate a food surplus.

Source: AMIB-Special Issue, MDD, 2001.

An analysis of the regional and ecological food deficit situation presented in Table 2.23 indicates that irrespective of national situation, mountains always remain vulnerable to food shortages. In all the years analysed, food production in the belt remained almost 24 to 38 percent short of the requirement. Although the situation slightly corresponds with the national situation, food shortages have been quite significant through time. The people in the *Terai* region, on the other hand, enjoy surpluses in food production amounting to slightly over 24 percent as of the last estimate. The development regions, save for the eastern development region, which has always remained in surplus, are all vulnerable to food shortages although these vary among regions and years

Among the 75 districts of the country, only 16 districts (21 percent) achieved a food surplus in the four years from 1994/95 to 1997/98, while the remaining 59 districts experienced food deficits (Table 2.24). Among the districts suffering from deficits, 11 districts experienced one year of shortage out of the total four years, two districts endured deficits for two years, nine districts for three years and the majority (37 districts) for four years in a row. Districts that experienced food deficits for four years in a row were mainly from the mountains (94 percent) followed by the hills (56 percent). None of the districts in the *Terai* experienced food deficit for four years in a row. This indicates the relative vulnerability of the three ecological belts in terms of food self-sufficiency¹⁵.

¹⁵ The four-year analysis represented years with persistent and sizable food deficits.

Table 2.24: Distribution of districts based on frequency of food deficits, 1994/95 to 1997/98

Ecological Regions	Food sufficient district	Number of districts reporting food deficit for			
		1 year	2 years	3 years	4 years
Mountain	–	–	–	1	15
Hill	5	7	–	5	22
<i>Terai</i>	11	4	2	3	–
Nepal	16	11	2	9	37

Source: MDD Data File.

2.7.2 Nutritional dimension of available food

A comparative assessment of dietary energy requirement and availability was made to examine the nutritional dimension of food security at the macro level in Nepal (Table 2.25). In terms of availability of dietary energy, the statistics show that the country experienced a deficit only in the years 1986 to 1988 and attained a surplus in the other years analysed.

Table 2.25: Nutritional dimension of food security

Particulars	Availability	Requirement	Surplus/Deficit
Total dietary energy (Kcal/day)			
1986-88	2 083	2 250	-167
1989-91	2 285		35
1994-96	2 267		17
1997-98	2 366		116
2000/01	2 577		327
Composition (in percent, 1995)			
Animal origin	6	20	-14
Vegetable origin	94	80	+14
Cereal and root crops	79	45	+34
Other	15	35	-20

Source: SIFAD-Asia Pacific Region, FAO Regional Office 1999 and MDD, 2002.

However, source-specific composition of available dietary energy is far from what is normally considered ideal from a nutritional perspective. In 1995, almost 94 percent of dietary energy available came from vegetable sources, which is 14 percent higher than the requirement. Even within vegetable sources, majority of energy available came from cereals and root crops compared to their normal contribution of 45 percent for a nutritionally balanced diet. From a nutritional point of view, the food security situation in Nepal is not at all favourable in terms of overconsumption of high carbohydrate foods.

2.7.3 Agricultural concerns in the food security issue

Several agricultural concerns with regard to the food security issue become apparent from the brief analysis presented in the foregoing sections. First, the country has continuously been in deficit (defined as a shortfall in production compared to requirements) even at the macro level for seven out of ten years in the 1990s, which calls for a strong drive to increase agricultural production. Second, the deficit situation has varied through time and has been found to be directly related to variation in paddy production, which is determined largely by the weather (i.e. the monsoon situation), thus necessitating increased efforts to expand irrigation facilities. Third, the deficit situation has varied across ecological belts and development regions, with the worst cases being the mountains among the ecological belts and the central, western and far western regions among the development regions. These, in particular, require government's efforts to attain ecologically and regionally balanced development. Fourth, the composition of food production tends to be biased towards food of vegetable origin and those with high carbohydrate content calling for increased emphasis on livestock and horticulture production.