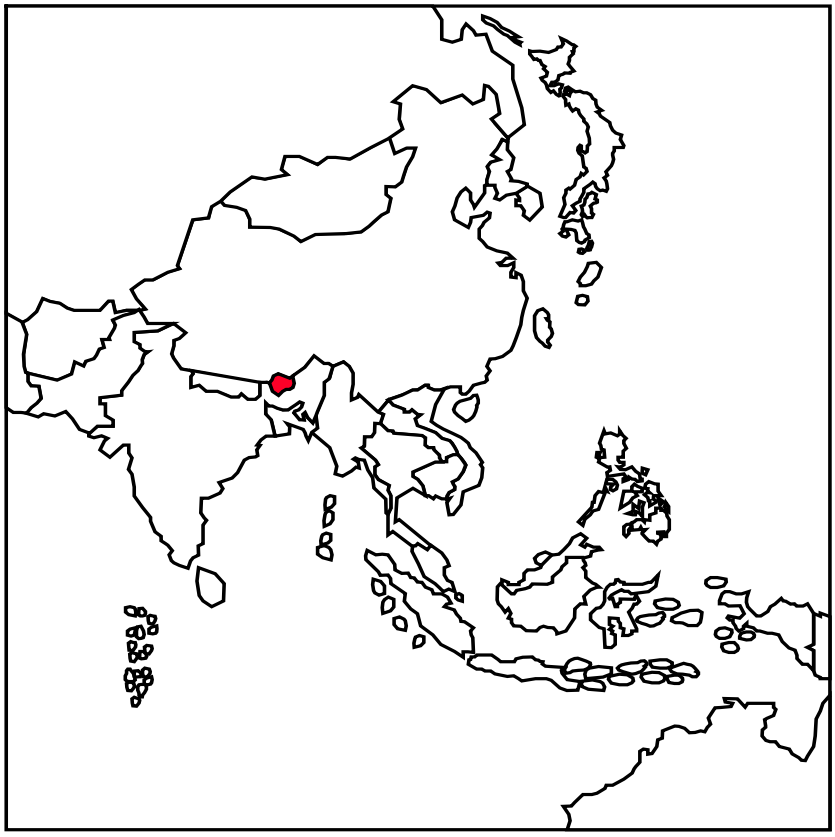
FAO - NUTRITION COUNTRY PROFILES

BHUTAN



FOOD AND AGRICULTURE ORGANIZATION

OF THE UNITED NATIONS

Note for the reader

The objective of the Nutrition Country Profiles (NCP) is to provide concise analytical summaries describing the food and nutrition situation in individual countries with background statistics on food-related factors. The profiles present consistent and comparable statistics in a standard format. This pre-defined format combines a set of graphics, tables and maps each supported by a short explanatory text. Information regarding the agricultural production, demography and socio-economic level of the country are also presented.

In general, data presented in the NCP are derived from national sources as well as from international databases (FAO, WHO...).

Technical notes giving detailed information on the definition and use of the indicators provided in the profile can be obtained from the Food and Nutrition Division, Assessment and Evaluation Service upon request. An information note describing the objectives of the NCP is also available.

Useful suggestions or observations to improve the quality of this product are welcome.

The data used to prepare the maps are available in Excel upon request at:

E-mail: nutrition@fao.org

Nutrition Country Profile of Bhutan

prepared by Mrs Cristina Petracchi (consultant in the Food and Nutrition Division, FAO) in collaboration with Ms Tshering Yangchen

Table of Contents

MAP is presented after the REFERENCES

Graphs, tables and maps can be visualised by clicking on the words in bold and underline, only in the "Full profile" pdf file

SUMMARY

The lack of data in Bhutan makes a comprehensive overview of the national food and nutrition situation difficult.

According to the nation-wide nutritional survey of 1986-88, the nutritional status of children (0-6 years) gave concern, as both the prevalence of underweight (37.9%) and the prevalence of stunting (56.1%) are considered to be serious public health problems according to the World Health Organization. The prevalence of wasting (4%), however, was less alarming ***(Table 4)****. Regional comparison identifies the nutritional status of the children in Central and Western zones as better than in the Eastern and the Southern zones, which may be partly explained by the inaccessibility and remoteness of the latter zones. There is no recent national representative data available on the nutritional situation of pre-school children. The results of a survey in 1996 in one Central and two Eastern districts present the nutritional status of children under 5 similar to the 1986-88 results. Data derived from growth monitoring in the country, however, indicate a decrease in the prevalence of underweight in infants from 1992 to 1997.*

Since 1983 the prevalence and severity of IDD have decreased, which is mainly due to a multisectorial IDD control programme including iodation of all salt in the late 1980's. The goitre rate of 6-11 year old children reduced from 59.7% in 1983 to 12.8% 1996 ***(Table 5)****.*

Anaemia has been identified as the single most complication of pregnancy in Bhutan. Even in the urban population of Thimphu 96% of pregnant women attending antenatal care in the JDW National Referral hospital were classified as anaemic, 39 % as severely anaemic.

The 1988-89 nation-wide nutrition survey classified 0.5% of children under 5 years with night-blindness, 0.1% with conjunctival xerosis and 0.1% with corneal ulcer with keratomalacia. The country launched, with success, a vitamin A supplementation programme in the late 1980's focussing on children and lactating mothers.

In general the diet in Bhutan consists mainly of cereals, with a low consumption of vegetables and fruits. The national average daily per caput energy intake was estimated to be 2,555 kcal. However, significant differences in the energy intake between different regions, urban and rural areas as well as between different socio-economic groups have been reported ranging from 1,647 kcal/day in Pemagatshel to 3,227 kcal/day in Punakha.

Morbidity in children is mainly attributed to Acute Respiratory Infections (15%), Intestinal Infections (10.6%) and skin diseases (10%). The unhygienic conditions in Bhutan pose a major threat to the health of young children

TABLE 1: GENERAL STATISTICS OF BHUTAN

Indicator (§)	*Year*	*Unit of measure*	
A. Land in use for agriculture			
1. Agricultural land	1995	ha per person	0,233
2. Arable and permanent crop land	1995	ha per person	0,085
B. Livestock			
1. Cattle	1994-96	thousands	435
2. Sheep & goats	1994-96	thousands	101
3. Pigs	1994-96	thousands	75
4. Chickens	1994-96	millions	0
C. Population			
1. Total population	1998	thousands	1917
2. 0-5 years	1998	% of total pop.	20,0
3. 6-17 years	1998	% of total pop.	29,1
4. 18-59 years	1998	% of total pop.	45,6
5. >= 60 years	1998	% of total pop.	5,2
6. Rural population	1998	% of total pop.	93,3
7. Population growth rate, Total	1995-2000	% of total pop.	2,8
8. Population growth rate, Rural	1995-2000	% of rural pop.	2,5
9. Projected total population in 2025	2025	thousands	3646
10. Agricultural population	1995	% of total pop.	94,0
11. Population density	1995	pop. per sq Km	37,7
D. Level of Development			
1. GNP per capita, Atlas method	1996	current US$	390
2. Human Development Index rating	1995	min[0] - max[1]	0,347
3. Incidence of poverty, *Total*	...	% of population	...
4. Incidence of poverty, *Rural*	1988	% of population	90
5. Life expectancy at birth (for both sexes)	1995	years	52
6. Under-five mortality rate	1996	per 1,000 live births	127
E. Food Trade			
1. Food Imports (US $)	1994-96	% of total imports	14,8
2. Food Exports (US $)	1994-96	% of total exports	13,7
3. Cereal Food Aid (100 MT)	1994-96	% of cereals imports	...
F. Indices of Food Production			
1. Food Production Index	1994-96	1989-91=100	106,8
2. Food Production Index Per Capita	1994-96	1989-91=100	99,0

BHUTAN

I. OVERVIEW

1. Geography

Bhutan is a small country in the Eastern Himalayas. It is landlocked, being bordered by India in the East, West and South and by the Tibetan region of the Republic of China in the North. The land area is 46,500 square kilometres and is almost entirely mountainous with flat land limited to the border river valleys and along the southern border. Altitude rises rapidly from 160 m in the South to more than 7000 m in the North in less than 100 km distance. Bhutan is characterized by three distinct climatic zones: the hot, sub-humid in the South with annual rainfalls of 2500-5000mm; the cool temperate in the inner Himalayas with annual rainfalls of 1000 mm-15000 mm and the alpine climate in the North with 400 mm of rainfalls.

Bhutan's rivers merge into four main river systems: the Wang chu, the Manas, the torsa (Ammochu) and the Sankosh. These river systems provide a hydropower potential of 20,000 MV, which is tapped. Forests, which harbour a number of rare animals and flora, cover about 75% of the country. These forests play a relatively important role in household food security and provide guaranteed resources for the Bhutanese economy (Yongyout. K, 1995).

Bhutan is administratively divided into 20 districts or dzongkhags. Each one contains a number of blocks or geogs with several villages per geog. Due to the mountainous terrain the villages are scattered and most of them are inaccessible by passable roads, having an impact on the nutritional situation of the people dwelling in these villages.

2. Population

In 1998, the population in Bhutan was estimated to be about 1.9 million inhabitants (**Table 1**). The Bhutanese population is growing at an annual rate of 2.8% and is estimated to reach 3.6 million inhabitants by the year 2025. The rapid population growth continues despite the high under five mortality rate (127‰) and the relatively low life expectancy at birth (52 years).

The average population density was estimated to be 38 persons/km^2 in 1995. The Bhutanese population is relatively young with almost 50% under 18 years of age (**Table 1**). Approximately 93.3% of the population live in rural areas. The population is unevenly distributed and the large river valleys and the eastern part of the country are the most populated.

Although only 6.7% of the population live in urban areas the number of inhabitants in Thimphu (the capital) has increased from 15,000 to 30,000 between 1987 and 1997, reflecting the increasing tendency to urbanization (UN, 1997). Besides the capital, Thimphu, the rural urban migration is also more prominent in Phuntsholing because of the job opportunities in these areas. The other major urban centres are Samdrup Jongkhar, Paro, Gelephu and Trashigang.

Bhutan has three main ethic groups: Ngalong, Sharchop and Lotshampa. Ngalong are of Tibetan origin and they occupy the Western region of the country. Sharchops are of Mongolian origin and they live in the Eastern mountainous region of the country. The Lotshampas, who mainly occupy the Duars valleys and Southern plains, are of Nepalese origin. Five different languages exist in Bhutan, but Dzongkha is the official one.

Bhutan is a Buddhist kingdom and Mahayanism is the main religion of the state. The Lotshampas who are of Nepalese origin are mainly Hindus. Buddhists still follow the old tradition of consulting religious leaders and astrologers and rituals and prayers are expected to continue to play a role influencing health behaviour.

3. Level of development: poverty, education and health

Emerging from self-imposed isolation, Bhutan began to build up basic infrastructure and services in 1961, establishing roads, schools, hospitals and a power grid, that tapped the hydroelectric potential of its rapid rivers and streams.

Education for all children is a principal aim of Bhutan and the government spends 22% of its budget on health and education (Ministry of Planning, 1990). The enrolment in the primary school has grown at 8% per annum so that now over 70% of primary school-age children are in school (44% girls) (Ministry of Health and Education, 1997). Through the community schools primary education has been made widely available even in the remotest areas. It is the aim of the Royal Government of Bhutan to achieve universal access to primary education by the year 2000. Despite this improvement in the educational system the literacy rate in 1995 remained at 29 %. It is estimated to be around 40 % at present, characterized by a big gender gap (56% male literacy compared to 28% female literacy) (UNICEF, 1998a).

Evolving from a health system based on traditional health care, Bhutan has gradually built up the health infrastructure since the 1960s in line with Five Year Plans (FYP). As a result Primary Health Care has improved and may have contributed considerably to reducing infant mortality, which decreased from 145 to 49 between 1984 and 1991 (Bohler E, 1994). Bhutan at present has three regional referral hospitals: Thimphu in the West, Mongar in the East and Yebilaptsa (proposed) in the Centre. The health infrastructure consisted in 1996 of 27 hospitals, 97 Basic Health Units (BHU) and 454 Out-Research Clinics, besides other primary health care facilities like dispensaries (Ministry of Health and Education, 1997). The health coverage has increased from 70% in 1992-93 to 90% during the 7 FYP with opening of additional BHUs and outreach clinics.

Despite the progress in modern medicine and preventive health care, the mortality and morbidity rates are still high because of the geographical conditions and the inaccessibility of many villages. Morbidity in children is mainly attributed to Acute Respiratory Infections (ARI)-15%, Intestinal Infections-10.6% and skin diseases-10%. The mortality rates due to these diseases in children below the age of 5 years are 0.03% from ARI and 0.4% from diarrhoea and dysentery (Health Division, 1995). Immunization coverage is high in Bhutan. In 1995-96 98% of one year old infants were immunized for TB, 87% for DPT, 86% for Polio and 86% for measles (UNICEF, 1998).

Because of the increased nutrient requirements and the high incidence of infectious diseases, adequate nutrition of infants and young children especially during the weaning period is a matter of concern. The unhygienic conditions (shortage of safe drinking water and poor sanitation e.g.) pose an additional threat to the health of young children in Bhutan.

4. Agricultural production, land use and food security

Agriculture contributes about 39.4 % to the GDP involving 80 % of the population and representing 7.7 % of the total land area of Bhutan (CSO, 1994). Agricultural land represented 0.233 ha per person in 1995 with 0.085 ha per person as arable and permanent cropland

(**Table 1**). Agriculture is diversified and the main crops are maize, rice, buckwheat, barley and millet, horticulture and animal products. Livestock rearing is an integral part of the farming system in Bhutan. About 90-95% of the rural households keep an average of 5-9 cattle/household, primarily for the manure of their fields and for supplying milk, butter and cheese for household use.

Small farms with limited scope for any further expansion and mechanization represent the main limiting factor for sufficient agricultural production in Bhutan. 58% of the farm households own less than two ha (Yongyout K., 1995). Therefore, landholders with small farms are forced to enter into complex tenancy contracts to increase their production. These landholders reportedly suffer from undernutrition, particularly their children, resulting from seasonal food shortages and poor health (FAO/RGOB, 1993).

In many villages 50% of the households are often food insecure while seasonally it may go up to 75% in some villages (FAO/RGOB, 1993). The people in remote areas mainly rely on their own production for food consumption, because food distribution in the country is affected by the lack of infrastructure within the country. A report of FAO/RGOB has classified 9 districts in Bhutan as food insecure in 1994 and concluded that there was a high incidence of chronic and transitory food insecurity in the northern and south-eastern parts of Bhutan. In other parts of the country the incidence of chronic food insecurity appeared to be low, while transitory food insecurity was prevalent (FAO/ RGOB, 1994).

5. Economy

Bhutan is categorized among low-income countries. The Gross National Product (GNP) of Bhutan is estimated to be US$ 390 per caput per year **(Table 1).** The Gross Domestic Product (GDP) in 1998 accounted for US$ 0.43 billions (World Bank, 1999)**.**

Bhutan's exports have increased in absolute terms, accounting for US$ 29 millions in 1987 and US$ 111 millions in 1998 (World Bank, 1999). However, its imports have continued to grow from US$ 101 millions in 1987 and US$ 136 millions in 1998 (World Bank, 1999) resulting in a negative trade balance, which is compensated by foreign grants and aid. Bhutan's economy experienced an average growth of 6.8 % per year in the 1980s. The increase has been mainly attributed to the realization of the Chukha Power project in 1987/88 and its involvement of other sectors particularly manufacturing. This is reflected in the change of the proportion of different sectors to the composition of the GDP during this period. While the proportion of the agricultural sector to the GDP declined from 55 % to 38 %, the contribution from sectors like electricity, transport, communication and manufacturing increased significantly from 1985 to 1995 (Ministry of Planning, 1996). The sector of electricity showed an average growth of 48.2% in this period. Bhutan achieved an average 7.1% growth in GDP in 1998 (World Bank, 1999).

Governmental investments include the improvement of the sewerage system, the renovation of dzongs and the telecommunication system of the country in the early 1990s. The investment in the private sector is also steadily increasing due to the support and encouragement of the government (Ministry of Planning, 1996).

II. THE FOOD AND NUTRITION SITUATION

1. Trends in energy requirements and energy supplies

Per caput energy requirements have decreased slightly from 2181 kcal/day in 1965 to 2161 kcal/day in 1995 and is expected to be 2217 kcal/day in 2025 **(Table 2)**. Trends in energy requirements reflect the changes in population structure and in particular the urban-rural distribution. While in 1965 only 2.8 % of the population lived in urban areas, the percentage of the urban population increased to 6% in 1995 and is expected to be even 15.6% in 2025 **(Table 2)**. The energy intake in urban areas is likely to be higher than in rural areas due to the inaccessibility to commodities in the rural areas given the rugged topography of the country. Food production and import in Bhutan have increased corresponding to the population increase. The total population increased by 86 % from 951 thousands in 1965 to 1.7 million in 1995 and is expected to be 3.6 million in 2025.

Table 2: Total population, urbanisation, energy requirements and dietary energy supplies (DES) per person and per day in 1965, 1995 and 2025

Year	1965	1995	2025
Total population *(thousands)*	951	1770	3646
Percentage urban *(%)*	2.8	6.0	15.6
Per caput energy requirements *(kcal/day)*	2181	2161	2217
Per caput DES *(kcal/day)* *	…	…	—

* Three-year average calculated for 1964-66 and 1994-96
… no data available

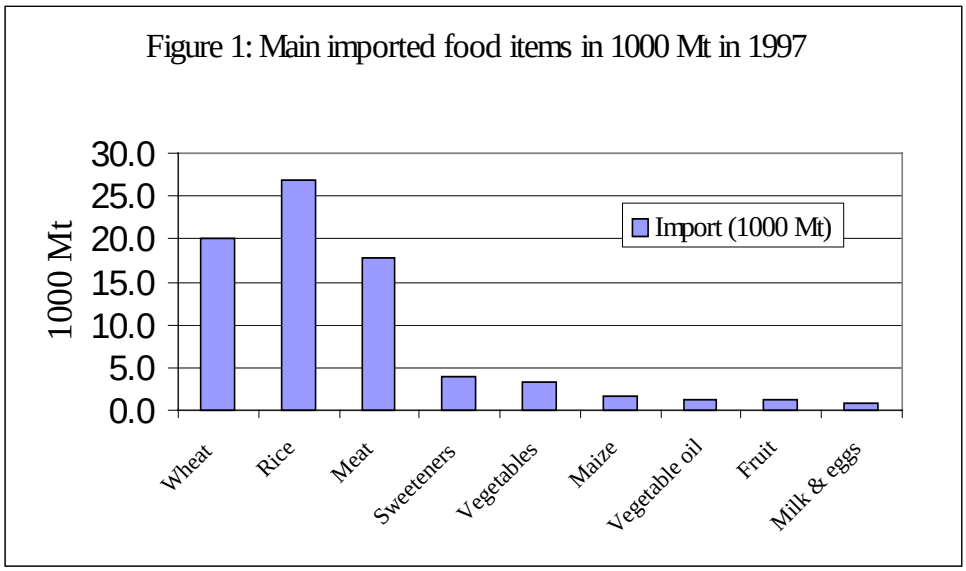
2. Trends in food supplies

Food production in Bhutan - Supplies of major food groups

Bhutan produced 107,877 MT of rice, 75,380 MT of maize and 6443MT of buckwheat in 1995 (Ministry of Agriculture, 1995). Bhutan is self sufficient in maize, barley, millet and buckwheat but only around 50% self-sufficient in rice and 30% in wheat. Generally it is about 60% self-sufficient in cereals. Almost all production of cereals is for domestic consumption (Yongyout K., 1995). The estimated production of milk and meat in 1990 was roughly 6000 tonnes and 2000 tonnes respectively (Yongyout K., 1995). Only a small proportion of the domestic production of cereals and livestock enter the formal market reflecting the subsistent food supply system in the country. The production of roots & tubers and pulses was 55,900 Mt and 1,600 Mt respectively in 1999 (FAOSTAT).

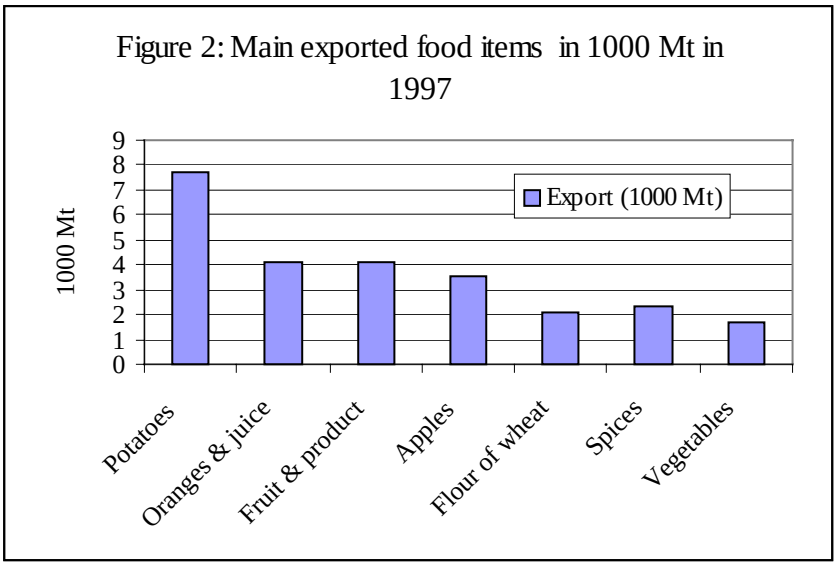
Food import

To cover the insufficiency of food caused mainly by the population increase and by limited scale of production, the Food Corporation of Bhutan imports subsidized quota items from India such as rice, wheat, edible oils, salt and sugar. As cattle are rarely slaughtered due to religious and cultural sentiments, animals and animal products are often imported. Due to the population growth and urbanization, land area used for agriculture tends to decrease and Bhutan risks depending heavily on food imports. Figure 1 presents a rough estimate of the amount of main food import items in Bhutan (FAOSTAT) **(Figure 1)**.



Food export

Bhutan produces potatoes, apples, oranges and spices (cardamom and nutmeg) for export **(Figure 2)** accounting for 48% of the total export income. Food exports account for 13.7% of the total exports of the country **(Table 1)**. Besides the above commodities Bhutan also exports a variety of fresh and processed fruits and vegetables. The high production of horticulture products is possible, even though the land occupied by this commodity is only 0.10% of the total land area of the country, which is almost the same as that of the settlement area.



3. Food consumption

Significant differences in energy intake and food consumption pattern exist throughout the country between different zones, urban and rural areas as well as between different socio-economic groups. However, there appears to be no significant difference in the intra-household food distribution and food intake between male and female members of a household in Bhutan.

The national average daily per caput energy intake was estimated to be 2,555 kcal, 78% of the calorie intake derived from cereals, 4-5% from meat, 2.5% from potatoes and 1.3% from horticultural products (Yongyout K., 1995). One survey conducted in 1981 in Punakha, a very prosperous district, showed that the average energy intake in 8100 males and females was 3227 cal/caput/day, 89 % derived from cereals. Protein intake on average was 58g/caput/day, 53% originating from plant and 47 % from animal sources. Fat intake was on average 26 g/caput/day. Significant lower figures of calorie intake in several districts, however, have been reported by the Royal Government of Bhutan/FAO for Lhuentse (1,909 kcal/day), Pemagatshel (1,647 kcal/day), Yangtse (1,646 kcal/day), Samdrup Jongkhar (1,712 kcal/day) and Gasa (1,701 kcal/day) (FAO/RGOB, 1994).

There is little information available on the consumption pattern of the Bhutanese population. Generally, butter and cottage cheese form an important part of the diet. Butter is used for cooking in all the regions or to prepare butter tea that is often consumed along with the breakfast. The food consumption patterns in the country differ greatly depending on the agro-ecological variation and the production system (Chhoden T. 1993). For simplicity and better understanding, the country can be broadly divided into three major zones based on the production system of an area: the maize, rice and buckwheat zones.

In the maize growing region, Eastern region, the ground maize (Kharang) is the essential element of the daily diet. Other major cereals consumed are rice, wheat, buckwheat and millet. These cereals are often consumed with a bowl of vegetables and potatoes prepared with curry and mixed with dried meat or fish. Alcohol is produced from the coarsely ground maize and used for home consumption, but farm labourers and visitors also consume it. Rice is a luxury item and is consumed during ceremonies and festivities.

In the rice growing area, mainly the Western region, rice is eaten three times a day at breakfast, lunch and dinner. It is usually consumed together with boiled vegetables, onions, cheese and a little butter or oil. Vegetables are not consumed in large quantities except for green chillies stewed with cheese, which is known as “Ema dhatsi”. Meat is consumed whenever available, often dried (“Sha-kam”) and consumed in small quantities of chopped meat with curry. Mainly pork and beef are consumed in rural areas while the trend in urban areas is changing towards the consumption of chicken and fish, while pork and beef remain popular.

In the buckwheat zone, buckwheat is consumed as bread or noodles (“putta”) after grinding it into flour. Sometimes it is eaten as porridge for breakfast. The inhabitants of this zone are used to eat three meals a day. Rice is consumed mainly during religious ceremonies and festivities. Yak meat is the main consumed meat in this region.

During pregnancy the consumption of butter and meat is emphasised (Gutierrez, E. 1994). In most parts of the country women are restricted from taking green vegetables, pumpkins and chillies etc. after delivery. About 90% of the mothers breastfeed their children for the first 12 months. However, exclusive breastfeeding is not commonly practised as complementary feeding is introduced as soon as 2-3 months in some areas (Bohler E. et

al.,1995). By the age of two years children start to eat the family diet (Yongyout K., 1995). Median duration of breastfeeding was 28 months and day and night breastfeeding on demand was continued throughout in a small-scale (98 mothers) qualitative survey in East Bhutan (Bohler E, et al. 1995).

4. Anthropometric data

The nutritional status of children under five is commonly assessed using three indices: weight-for-height (wasting) which reflects acute growth disturbances, height-for-age (stunting) which reflects long-term growth faltering and weight-for-age (underweight) which is a composite indicator of both long and short term effects. Weights and heights of children are compared with the reference standards (NCHS/CDC/WHO) and the prevalence of anthropometric deficits is usually expressed as the percentage of children below a specific cut-off point such as minus 2 standard deviations from the median value of the international reference data.

There is unfortunately no anthropometric data on adolescents and adults available in Bhutan. The few national representative anthropometric data available on children from 0-6 years is presented in table 4. It is obtained from the nation-wide nutritional survey of 1986-88 (Bhutan Directorate of Health, 1989). The nutritional status of children in that age group is of concern as both the prevalence of underweight (37.9 %) and the prevalence of stunting (56.1 %) are considered as serious public health problems, according to the World Health Organization (WHO, 1995a). The prevalence of wasting (4 %) was less alarming **(Table 4).**

Table 4: Anthropometric data of children

Source/ Year of survey	Location	Sample			Percentage of malnutrition						
		Size Number	Sex	Age Years	Underweight %Weight/Age		Stunting %Height/Age		Wasting %Weight/Height		Overweight %Weight/Height
					< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD	> +2SD
Bhutan	National	3273	M/F	0-5.9	...	37.9	...	56.1	...	4.1	2.0
Directorate	Central zone	799	M/F	0-5.9	...	25.9	...	49.8	...	0.6	2.5
of Health	Eastern zone	826	M/F	0-5.9	...	42.4	...	63.6	...	5.2	2.3
Services	Southern zone	801	M/F	0-5.9	...	44.3	...	54.6	...	5.1	1.4
1989	Western zone	847	M/F	0-5.9	...	25.7	...	49.6	...	2.1	2.5
	National	1680	M	0-5.9	...	37.6	...	57.2	...	4.0	2.2
	National	1593	F	0-5.9	...	38.3	...	54.9	...	4.2	1.9
Save the	District										
children	Shemgang	354	M/F	0-5	...	24.3	...	53.1	...	...	...
1990											

Notes: ... no data available.
Each index is expressed in terms of the number of standard deviation (SD) units from the median of the NCHS/CDC/WHO international reference population.

Regional comparison reveals that the nutritional status of the children in the Central and the Western zone as better then the one in the Eastern and the Southern zone, which may be partly explained by the inaccessibility and remoteness of the two latter zones. In this study no significant gender difference could be identified.

Surveys conducted in 1990 in the Shemgang district (Save the Children, 1990) **(Table 4)** and in 1996 in one Central and two Eastern districts (Trashiyantshe, Pema Gatshel and Zhemgang) (Health Division, 1996) present a similar nutritional status for children under five years. In Shemgang underweight was present in 24% of the children, while 53% suffered from stunting. The survey carried out in 1996 included 2118 children. Underweight was present in 40.6 %. In Trashiyantshe underweight and wasting was present in 46.7 % and 4.3 % of 709 children under 5, respectively. There seems to be no improvement in the nutritional status of children since the National Survey in 1986-88. According to the data originating from growth monitoring in the country, however, the prevalence of malnutrition in infants decreased from 1992 to 1997 (Annual Health Bulletin, 1997).

Low Birth Weight (LBW), defined as birth weight below 2500 g, was 16.2% and 15.8% in 1992 and 1994 respectively (Yongyout K, 1995). Low birth weight reflects not only the nutritional status of the new-born but also of the mother. Considering that the data on LBW prevalence is obtained from hospitals accounting only for 15% of the total births in Bhutan and reflecting a socio-economically more privileged population group, LBW prevalence in rural areas would be even higher (Yongyout K, 1995).

5. Micronutrient deficiencies

Iodine Deficiency Disorders (IDD)

Iodine deficiency disorders (IDD) include the clinical and subclinical manifestations of iodine deficiency. Iodine deficiency in pregnant women may cause irreversible brain damage in the developing foetus, whereas in infants and young children it may cause brain damage, psychomotor retardation and intellectual impairment.

Mainly because of the implementation of the IDD control programme by the Royal Government of Bhutan the prevalence of IDD has decreased in Bhutan. The multisectoral control programme includes iodation of all salt consumption, selective iodized oil injection, monitoring the iodate content of the salt and community education (Yongyout K, 1995). The major strategy has been through the iodation of all salt entering the country at a plant set up in Phuntsholing in 1985 (UNICEF, 1990).

The First National IDD Survey in 1983 reported a mean national goitre prevalence of 59.7% in school-age children, ranging from 41.2% in Thimphu to 84.7% in Samchi (Kochupillai, N. et al., 1986) **(Table 5)**. In 1991-1992 a study using a 30-cluster sample survey method was carried out in 2 districts (one in the north and another in the south). It indicated that goitre prevalence in children (6-11 years) and in women (15-45 years) was 18.4% and 28.5% in the north and 32.5% and 45.9% in the south respectively (Chhoden, T. and Schachtel, A., 1992) (Directorate of Health Services, 1992) **(Table 5)**. The prevalence of cretinism was 0.4% for children and 0.9% for women in the north and 0.4% and 0.8% for children and women respectively in the south. Furthermore, impact of salt iodation and distribution was quite apparent since more than 95 % of samples were adequately iodized in both districts.

A study carried out in 1996 on 1200 school children identified 12.8 % of the children with palpaple and 1.2 % with visible goitre, whereas the total goitre rate in the 6 - 11 year old children was 14 % (Health Division, 1998) **(Table 5)**. Median level of urinary iodine excretion was 23µg/l. 3 % of the population excreted ≤ 20 µg/l and 76 % > 101 µg/l (Health Division, 1998).

Comparison of the three surveys carried out in 1983, 1992 and 1996 reveals a decrease in the prevalence and severity of iodine deficiency disorders. The percentage of the population with urinary iodine excretion < 100 µg/l, decreased from 96.9 % to 60.5 % and 24 % respectively. Simultaneously the goitre rate in school children reduced from 59.7% in 1983 to 12.8% in 1996.

Anaemia/Iron Deficiency (IDA)

The consequences of Iron Deficiency Anaemia (IDA) include reduced physical work capacity and productivity, impaired cognitive functions and brain metabolism and reduced immunocompetence. IDA is characterised by a multifactorial aetiology. In Bhutan the low vitamin C intake, the presence of inhibitors of the iron absorption like phytates in cereals and the high prevalence of hookworms seem to be the main contributing factors to the anaemia prevalence. The prevalence of hookworms was 15.2%, 4.3% and 4.3% in pregnant women, pre-school and school going children respectively (Sood SK and Sharma S., 1985). The availability of iron rich food, however, does not seem to be a main concern.

A survey carried out in 1985 in three different zones (Thimphu, Gaylegphug and Tashigang) indicated that 58 % of 550 pre-school children (< 11 g/dl Hb), 36 % of 266 school children (< 12 g/dl Hb) and 59 % of 562 pregnant women (< 11 g/dl) were anaemic. On the sub-sample basis, 38 % of 135 pre-school children, 25 % of 102 school children and 45.5 % of 457 pregnant women had depletion of stored iron, indicated by < 12 µg /l of serum ferritin (Sood SK and Sharma S., 1985). Anaemia has been identified as the single most complication of pregnancy (Annual Health Bulletin, 1997). Even in the urban population of Thimphu 96% of 2,400 pregnant women attending Ante Natal Care in the JDW National Referral hospital in 1996 were classified as anaemic, 39% as severely anaemic (< 10 g/dl haemoglobin). In the same hospital in 1994, 1.7 % (28/1,642) and 2.3 % (67/2,885) male and female in-patients aged 15 years and older respectively were hospitalised primarily due to severe anaemia (UNICEF, 1994).

Vitamin A Deficiency

Vitamin A is an essential micronutrient required for normal health and survival. It is involved in several critical functions in the body including vision, immune system, reproduction, growth and development. Children under five years are more susceptible to vitamin A deficiency (VAD). The consequences of VAD are tragic and include night blindness, irreversible blindness, growth retardation and increased susceptibility to infections. Pregnant women are also prone to VAD and their children are likely to become deficient.

A survey carried out 1985 identified 14% of 134 pre-school children and 13% of 149 pregnant women with serum retinol < 0,35 µg/l (Sood SK and Sharma S., 1985). The 1988-89 nation-wide nutrition survey classified 0.5% of children under 5 years with night blindness, 0.1% with conjuctival xerosis and 0.1% with corneal ulcer with keratomalacia (Directorate of Health Services, 1989). However, due to the vitamin A supplementation programme the

situation has improved and vitamin A deficiency is not considered a public health concern any more than in 1985. The vitamin A supplementation programme has been institutionalized as an Expanded Programme for Immunization Plus activity since the late 1980's. All children and lactating mothers attending Maternal and Child Health clinics are provided with high potency vitamin A capsules (Yongyout K., 1995). In order to combat vitamin A deficiency a nutritional education programme focussing on the need to consume vitamin A rich food is a priority for Bhutan. For this purpose a kitchen garden project was initiated as a pilot project in Central Bhutan and is now in the stage of being expanded to mega-project areas through the Integrated Horticulture Program funded by UNDP.

Table 5: Surveys on micronutrient deficiencies

Source/ Year of survey	Deficiency	Location	Sample			Percentage
			Size Number	Sex	Age Years	
	Iodine	**National**				
Kochupillai N. et al.		11 Districts	12045	M/F	School	59,7
1986		Central Districts	1268	"	age	71,6
1983		Eastern Districts	4072	"	"	53,0
		Southern Districts	4607	"	"	63,0
		Western Districts	2098	"	"	65,1
		Chirang	1015	"	"	62,4
		Daipham	…	"	"	56,0
		Galegphug	2317	"	"	64,9
		Mongar	1098	"	"	58,4
		Paro	615	"	"	78,8
		Samchi	349	"	"	84,7
		Samdrupjongkhar	926	"	"	56,6
		Shemgang	581	"	"	65,7
		Tashigang	2974	"	"	52,2
		Thimphu	919	"	"	41,2
		Tongsa	687	"	"	74,3
		Wangdiphodrang	564	"	"	64,1
Directorate of Health		**National**				
Services, 1992		North	1581	F	15—45	28,5
1992		"	1443	M/F	6—11	18,4
		South	998	F	15—45	45,9
		"	992	M/F	6—11	32,5
Health Division, 1998		**National**	1200	M/F	School	12,8
1996					age	

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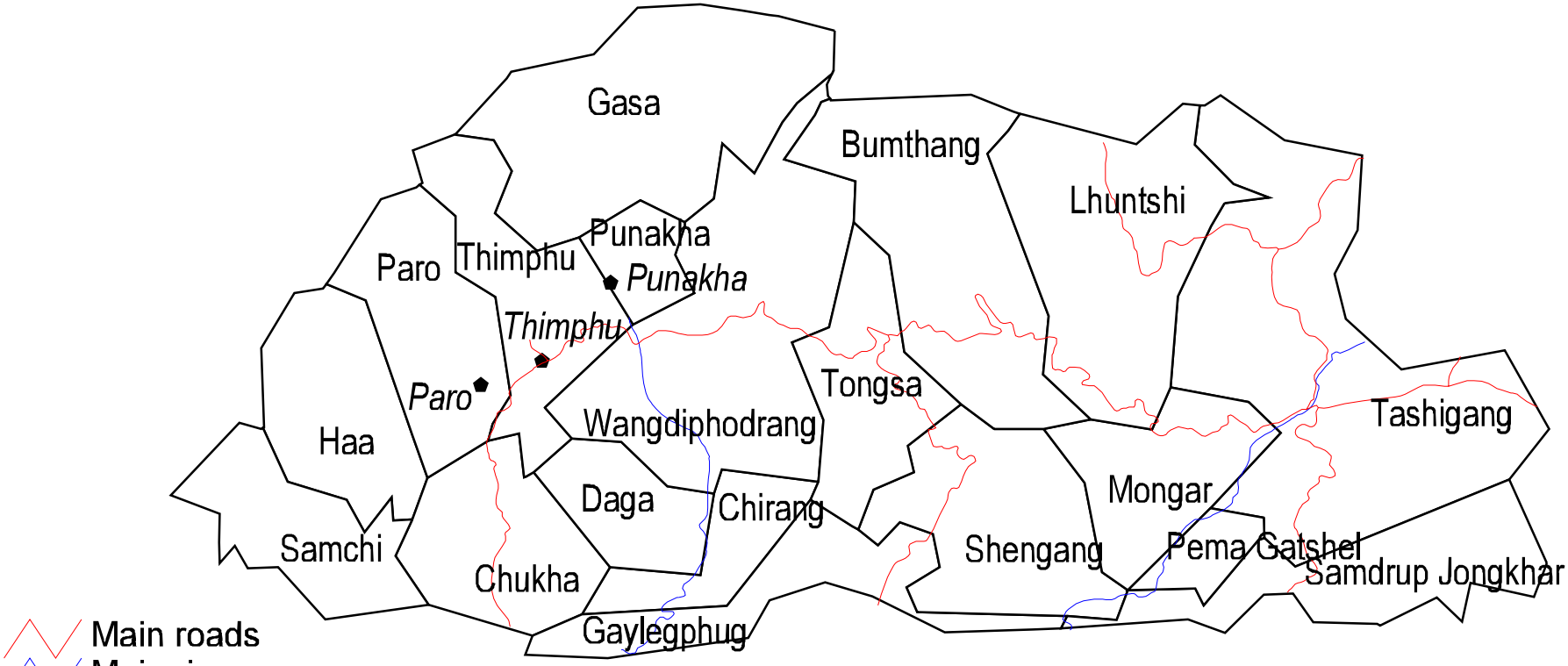
References for data presented in Table 1 of Global Figures, unless otherwise stated:

Source:	*Indicator:*
FAOSTAT. 1997	*A.1-2, B, C.10-11, E.1-3, F, G*
UN. 1996/1997	*C.1-9, D.5*
World Bank. 1997.	*D.1*
UNDP. 1997.	*D.2*
Tabatabai H. 1996.	*D.3-4*
UNICEF. 1997.	*D.6*
FAO. 1996.	*H*

General map of Bhutan



Scale 1 : 1 800 000 (approx.)
Geographic Projection

FAO - ESNA, March 1999

Bhutan