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The newly formed State of Uttaranchal in India has diverse agroclimatic conditions. The region is sparsely populated, communication is difficult, and many areas are inaccessible. Natural catastrophes such as droughts and landslides are common. The region lags behind in agro-industrial development, and the level of poverty is high. Earlier studies indicate that the health of the residents in this region is generally poor. Hilly terrain imposes a heavy burden on the health of the people and aggravates the problem of undernutrition. A project was carried out between April and July 2000 to assess the state of undernutrition among indigenous people in the Garhwal Himalayas of the State of Uttaranchal. The term "indigenous" in this context refers to the native born people of the Garhwal Himalayas, also known as Garhwali. A total of 854 respondents were studied in 3 agroclimatic situations—the high hills, mid hills, and low hills, also classified by Gupta (1983) as subtropical (250–1200 m), subtemperate (1200–1700 m), and temperate (1700–3500 m)—as well as in rural and urban settings. The study revealed that over 30% of the population suffers from undernutrition, higher than the average of 20% according to Wardlaw (2000). However, gender did not appear to affect the level of undernourishment. The agroclimatic situation had the maximum negative impact on the nutritional status of the indigenous population. Rural people too were found to be more undernourished than the urban population. It may thus be concluded that the groups identified in the study, namely the people residing in the high hills and the rural population, on whom developmental activities should be focused, are relatively undernourished.

Keywords: *Undernourishment; undernutrition; health; rural population; Garhwal Himalayas.*

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Introduction

Nearly 1 in every 5 persons in the developing world is chronically undernourished (ie, too hungry to lead a productive life); this is twice as many as a decade ago. The majority (two thirds) of undernourished people live in Asia (Wardlaw 2000). According to Bhattarai (1998), South Asia has 29.7% of the world's population and 46.4% of the world's poor (who number more than 1 billion). If it is true that material poverty affects 50% of the region's population, then 75 million people in the Himalayas are poor. The nutritional status of a population depends fundamentally on the interaction between genetic, environmental, and sociopolitical factors (Infant and Cordeo 1997). The theory that humans are a product of their environment rings true when one looks at the condition of hill people today. It must be acknowledged that the price of ecodegradation is being paid most heavily by poor hill farmers owning small and fragmented plots of land. The degraded environment is directly linked to reduced productivity and depletion of other natural resources that have been the mainstay of the hill population for centuries. This decrease of indigenous wealth automatically lowers the standard of living of the local people and their nutritional status is the first casualty (Dutta 1998b).

The Himalayan ecosystem has distinct characteristics: rich and varied stores of plant and animal species, which are now seriously threatened. The biophysical and socioeconomic resource base is being impoverished by human action. A study by the International Centre for Integrated Mountain Development (ICIMOD) revealed a large number of negative indicators such as a degraded biophysical and socioeconomic resource base, suggesting that mountains are in a state of unsustainability (Singh and Sharma 1998). This fact was reinforced by surveys conducted in Nepal, indicating that 5% of children below 5 years of age are severely undernourished and in need of immediate attention. In some districts as many as 25% of the children suffer from severe undernutrition (Pant et al 1997). It thus comes as no surprise that nutritional assessment studies conducted in the Garhwal Himalayas present a dismal picture. Earlier studies indicate that the health of the residents of this region is generally poor, with children most seriously affected (Dutta and Kumar 1997). Previous evaluation of the nutritional status of the population in the Garhwal hills of Uttaranchal indicates that, comparatively, overall health is inferior to that of people elsewhere in the country, as well as in other developing nations. In a previous study by Dutta (1998a), of all the children surveyed, only one fifth qualified as nutritionally normal, leaving roughly 80% in the malnourished category. In contrast, 36% of children in the developing world, excluding China, are malnourished; about 34% are stunted, and 8% are wasted (Carlson and Wardlaw 1990). It is also apparent from the study that children suffer from higher levels of poor health than adults, with preadolescents, adolescents, and teenagers the worst off nutritionally. This indicates that certain specific factors may have adverse effects on health, as children grow older (Dutta and Kumar 1997). Limited information exists on the determinants of growth during this critical period of life, particularly for rural populations in developing countries (Ferguson et al 1997). The pres-

ent study attempts to assess the overall level of undernourishment in the Garhwal Himalayas in relation to agroclimatic conditions in the region and to draw the attention of the scientific and administrative communities to this crucial indicator of development.

Study area

The Uttaranchal hills offer breathtaking scenic beauty, but those who till the soil face difficult ordeals: tricky terrain and awesome settings make survival here an arduous test of endurance. The hills, mountains, and rivers that combine to form the beauty of the Himalayas are not always amenable to livelihood. For the indigenous Garhwali population, the unrelenting struggle for survival is a daily fact of life. Inadequate communication and infrastructure have deprived the people of whatever government aid is available.

Table 1 shows the demographic characteristics of the study area. The State of Uttaranchal lies in the central Himalayas, including the foothills as well as the highest peaks of the Himalayas. Agriculture is the occupation of 70.6% of the population. A total of 13.21% of the area is under cultivation. The amount of cultivable land available per worker is 0.68 ha as compared with 0.83 ha in the State of Uttar Pradesh. The state is a major supplier of temperate fruits and off-season vegetables. Its forest resources include timber, fuelwood, fodder, medicinal plants, resin, and a number of other minor forest products. Unfortunately, due attention has not been given to the development of the state. Disruption of the ecosystem and resultant scarcities of water, food, fodder and fuel have made it difficult for the people to maintain even a subsistence existence (Dutta 1998b). Traditional arrangements have slowly changed, with increased physical, administrative, and economic integration of mountain areas into wider socioeconomic systems extending beyond the mountains. The result is marginalization of both traditional resource use practices and indigenous coping mechanisms. This has increased pressure on mountain resources and led to external interventions to extract natural wealth from mountains. Resource use is demand-driven rather than supply-driven. The final consequence is the emergence and accentuation of cumulative environmental change, leading to unsustainability of previously sustainable subsistence systems (Jodha 2001).

Methods

Sample selection

The Garhwal Himalayas are a large hill area comprising 13 districts. The Tehri District has been rated as one of the most underdeveloped in Uttaranchal. This district was chosen for the study to examine the true state of undernourishment of the people in this region. Towns

TABLE 1 Demographic characteristics of the State of Uttaranchal. (Source: Nandy and Rao 2001).

Population (as per 2001 provisional census)	8,479,562
Annual average exponential growth rate (1961–2001; %)	2.16
Geographical area (km^2)	53,485
Population density	132
Persons per km^2	159
Dispersion level	4
Sex ratio for the year 2001	964
Sex ratio of 0–6 years age group (year 2001 female/1000 male)	906
Literacy rate (%)	72.28
Change in literacy level (1991–2001; %)	25.16
Male literacy (%)	84.01
Female literacy (%)	60.25
Share of female in total literacy (%)	41.17

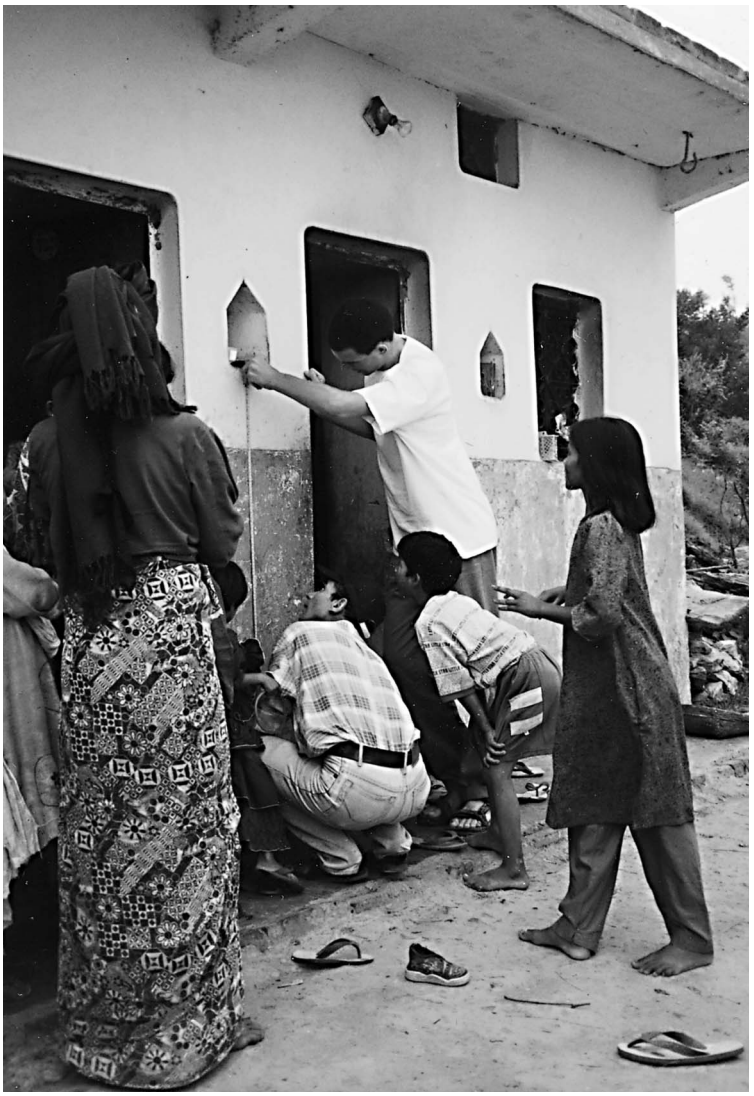

FIGURE 1 Project staff collecting data in a mid hill village. (Photo by A. Dutta)

Area	Rural population			Urban population			Total population		
	Male	Female*	Total	Male	Female*	Total	Male	Female*	Total
High hills	76	136	212	–	–	–	76	136	212
Mid hills	59	104	163	59	106	165	118	210	314
Low hills	67	112	179	48	87	135	114	202	328
Grand total	202	352	554	107	193	300	309	545	854

TABLE 2 Sample size.

*Overrepresentation of female population due to outmigration of males from study area

and villages in the 3 agroclimatic zones, high hills, mid hills, and low hills, were chosen for purposive sampling, as the aim was to cover all age groups and castes as well as both sexes. Forty families from each town and village in the 3 agroclimatic zones were selected at random. Because no township existed in the high hills of the study area, the total number of families covered was 200. The body mass index (BMI) of each family member was assessed to obtain a uniform representation of age and sex (Figure 1). It should be noted that migration of males to the plains in search of employment is an age-old practice in the Himalayan region. This phenomenon is responsible for an overrepresentation of females in the present study. A total of 854 individuals were studied.

Assessment of nutritional status

The nutritional status of the population was assessed with the help of BMI, with age-specific cutoffs. BMI was used as a noninvasive clinically convenient manner of assessing chronic nutritional deficiency and overweight in individuals over 1 year of age. The resulting percentages can be used to grade the degree of impact of inadequate or excessive nourishment (Pipes and Trahms 1993). BMI is calculated by dividing body weight by the square of height. A BMI of 17.0–18.49 indicates Grade I thinness, 16.0–16.99 indicates Grade II thinness, and below 16 indicates Grade III thinness. A BMI of 25.0–29.99 indicates Grade I overweight, 30.0–39.99 Grade II overweight, and BMI equal to or above 40 indicates Grade III overweight (WHO 1995). These categories can be interpreted as follows: Grade I thinness indicates a slightly undernourished individual, Grade II a moderately undernourished individual, and Grade III a severely undernourished person. The same critera are applicable for overweight persons. The normal range for BMI is 18.5–24.99 (eg, nutritionally normal). This describes people who have access to all the nutrients needed to maintain life and reproduction.

Deficits in one or more of the anthropometric indices (such as BMI) are often regarded as evidence of "undernutrition." However, it should not be assumed that such deficits are solely the result of nutrient or energy deficits (often, in turn equated with a lack of food intake). A significant deficit in a physical measurement, indicating past or current undernutrition at the cellular level, could be primarily because of lack of food, an increased rate of nutrient use (as in many infectious diseases), or impaired absorption or assimilation of nutrients (or all three). The combination and interaction of these processes contribute to much of the deficit in growth or physical status observed in less-developed areas. Thus, anthropometric findings alone do not define the specific processes leading to malnutrition (WHO 1995). The aim of this study was to highlight the level of undernourishment in the Garhwal Himalayas, where little work has been done in the area of nutrition and health. Further in-depth studies need to be designed on the basis of these preliminary fundamental findings. To facilitate interpretation of the data, percentages were calculated, and the chi-square test was applied to test the significance of difference among the different groups in the sample (Gomez and Gomez 1976).

Results

The study area was divided into 3 agroclimatic zones, high hills, mid hills, and low hills, where the population distribution was 10.4%, 48.4%, and 41.2% (Negi 1994) and 212, 328, and 314 individuals were studied, respectively (Table 2). Because no townships were present in the high hills, data pertaining to this area could not be collected. A total of 854 individuals were studied, of which 309 were male and 545 female. Women were overrepresented by as much as 27.7%; this overrepresentation in the study area has been explained by Rawat (1997), who states that 40% of the male population in the Garhwal Himalayas are known to migrate to urban centers in search of employment.

Figure 2 shows the overall nutritional status in the study area. More than 55% of the population was found to be healthy, with more than 13% overweight. No individual qualified as being Grade III overweight. The rest of the population, about 30.8%, was undernourished, the majority being Grade I thin (15.6%) or slightly undernourished, followed by Grade II (8.1%) and Grade III thinness (7.1%). Breakdown of the population by sex depicts a similar trend, with a majority of both males and females being nutritionally normal and the numbers steadily decreasing with the severity of undernutrition. Because the chi-square values are greater than the tabular values at 1% level of significance for normal and overweight groups, there is a significant difference in gender-related nutritional status in these 2 categories. Because the number of nutritionally normal and slightly overweight women is greater than the number of men in these categories, women appear to be slightly better nourished than their male counterparts.

Figure 3 shows the nutritional status of the people

residing in the different agroclimatic zones. Health trends were similar to those discussed above, with a majority of the population being healthy. The percentage of nutritionally normal people was more or less the same in the 3 agroclimatic zones. There was an increase in Grade III thinness (severe undernourishment) among the people living in the high hill areas (11.13%). At the same time, the number of people in the overweight category is the lowest in the high hills. This suggests that people in the high hills are at slightly greater risk nutritionally and thus require special attention.

The study also compared rural and urban health in the study area (Figure 4). An almost equal percentage of the population fell into the healthy category in both rural and urban areas. However, the number of undernourished individuals in each grade of thinness was significantly higher in rural areas (17.90% Grade I thinness, 9.7% Grade II thinness, and 8.12% Grade III thinness in rural areas, as compared with 11.3%, 5.01%, and 5.05% in each grade in urban areas). In contrast, the number of overweight people was much greater in urban areas, especially in the Grade I category (20.06%), in comparison with rural areas. None of the chi-square values shows a good fit at the 1% level of significance, indicating that the difference in nutritional status is statistically significant between rural and urban populations in the study area. This suggests that the nutritional status of the rural population is relatively inferior to that of the urban population, identifying the former as nutritionally vulnerable.

Discussion

An analysis of these results highlights a variety of features that appear to be typical of the study area. The first is that almost 30.8% of the population of the region is undernourished. This fact in itself is reason for concern because 21% of children at the national level are classified as undernourished (UNDP 2001). In terms of international standards, the picture is even grimmer because it is estimated that nearly 1 in 5 persons (20%) in the developing world is chronically undernourished (Wardlaw 2000).

It emerged that the nutritional status of women was on par with that of men, belying the popular belief that females are relatively more undernourished than males, especially in India, according to Kunwar and Pillai (1998), who found severe undernourishment, wasting, and stunting in 8.38%, 6.90%, and 1.32% of girls and 8.78%, 0.32%, and 1.20% of boys, respectively. It was concluded that dietary inadequacy was more pronounced in girls and signs of nutritional disorders were more frequent. However, a study by Chauhan et al (1999) among tribal children of Rajasthan shows a trend similar to that observed in this study. This study found that boys have weak or very weak body builds and

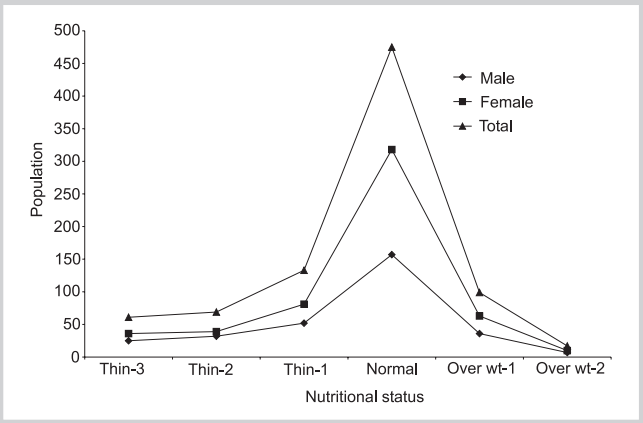

FIGURE 2 Overall nutritional status in the study area.

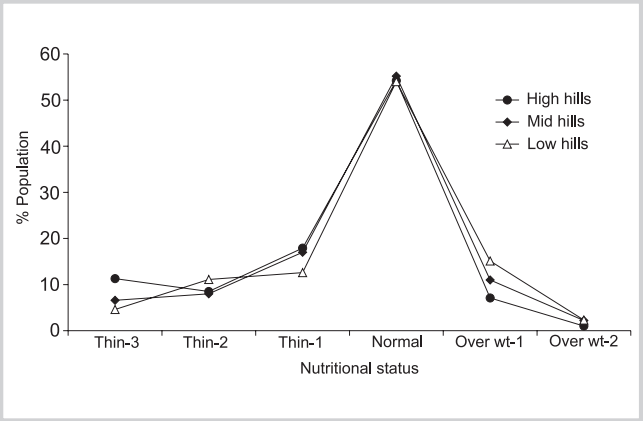

FIGURE 3 Nutritional status in the 3 agroclimatic zones of the study area.

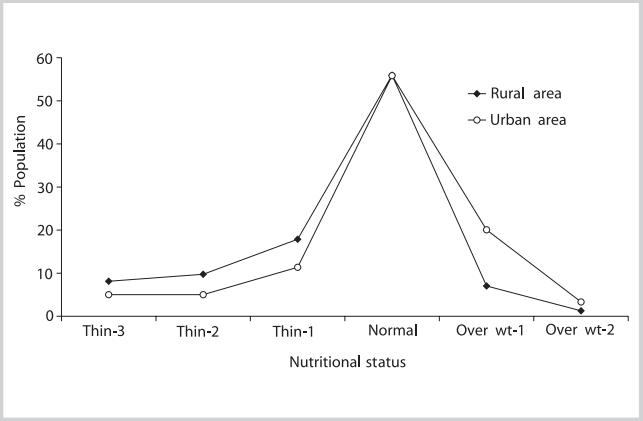

FIGURE 4 Nutritional status in urban and rural regions of the study area.

categorized them as suffering from low or mild undernutrition. In comparison, girls had average or good body builds. None of the boys were found to be obese or sturdy, whereas 4.7% of the girls were obese and 1.6% were sturdy. Obese in terms of BMI refers to a person over 30 or in the overweight II category, whereas a sturdy person is one with a BMI between 18.5 and 25 or in the well-nourished category.

Comparison of the nutritional status of individuals

living in the 3 agroclimatic zones clearly shows people residing in the high hills to be nutritionally inferior to their counterparts in the mid and low hills. This might be because the economic condition of this mountain region is adversely influenced by difficult mountain terrain, poor natural resources, high population density, dependence of agriculture on rain, high costs involved in the economic development of the region, and the poor condition of roads and other transport links (Negi 1994). All these factors may indirectly aggravate the prevalence of undernutrition among people residing in the high hills.

The relative state of nutrition of people residing in the rural and urban areas of the Garhwal Himalayas was also studied. People living in rural areas emerged as being at higher nutritional risk than those in urban areas. A study by Bamji and Thimyamma (2000) supports this finding. They found that undernutrition is widespread in both mothers and children in rural India. Family landholdings, seasonal occupations, and mothers' occupations had minor influences on the nutrition of the respondents. Yamauchi et al (2001) also report in a study carried out in the Papua New Guinea highlands that urban subjects were heavier and taller than their rural counterparts.

Conclusions and recommendations

In this scenario, the measures proposed for segments of the hill population that have emerged as nutritionally vulnerable must encompass the interaction of a multiplicity of factors, many of which are thoroughly embedded in the cultural and traditional beliefs of the region. The nutrition of the people in the study area has far-reaching implications, particularly because the Himalayas have a fragile ecosystem. Further attempts to exploit natural resources to meet the basic needs of the indigenous population may lead to irreversible degradation, as explained in an ICIMOD newsletter (Pascual 2001), where poverty, death, and environmental degradation are explained as products of pressure on resources. In recent years this has led to reports of increasing environmental fragility within mountainous regions, suggesting that the prerequisite to a healthy environment is a healthy population. Undernutrition leads to mental impairment among children and low work output among adults. Chronic undernutrition also has a tendency to precipitate nutritional deficiency disorders such as anemia, goiter, and night blindness. Undernutrition further accentuates adult chronic diseases such as diabetes, heart disease, hypertension, and cancer (Wardlaw 2000; Swaminathan 2003).

On the basis of information currently available, the Food and Agriculture Organization of the UN (FAO) estimates that more than half of the mountain population in developing and Commonwealth of Independent States (CIS) countries (250–370 million people) is vulnerable to food insecurity. (This estimate of vulnerability is not to be confused with the FAO's estimates of the undernourished population. Typically, about half of those identified as vulnerable are actually undernourished.) As noted above, mountain environments differ according to altitude, latitude, and terrain. These differences influence both livelihood opportunities and sources of vulnerability.

Cultural traditions in mountain regions are often strong and resilient. Yet, lack of crop diversity and limited access to current information and knowledge about good nutrition and health care practices expose mountain people to high rates of malnutrition and disease. Traditional attitudes and beliefs may also lead people to continue land-use practices that are no longer suitable to evolving conditions in mountain environments. In many places, traditional livelihood strategies are no longer sustainable because of mounting demographic pressure, rapid deforestation, erosion, and loss of soil quality. Mountain cities offer economic opportunities but bring with them pollution, increased need for cash, and weakening of indigenous highland institutions. The overall picture that emerges from this analysis is a state of undernutrition in the Garhwal Himalayas that is rather grim. Efforts are needed to improve the situation. A beginning could be made by starting a food for ecodevelopment program that promotes the use of food grains as wages to establish water-harvesting structures and rehabilitate degraded lands and ecosystems (WFP 2001).

It is necessary to develop institutional structures that will confer upon farm families with small landholdings the advantage of scale, at both the production and postharvest phases of agriculture. For example, because of the cooperative method of organization of milk processing and marketing, India is now first in the world in milk production. Strategic partnerships with the private sector will help farmers' organizations gain access to assured and remunerative marketing opportunities (Swaminathan 2003).

Another measure to counter undernourishment in the study area is enlargement of the food basket. In the past, local communities depended on a wide range of crops for food and nutrition security. It is important to revive old dietary traditions, with particular attention to leafy vegetables rich in micronutrients.

At the same time, it is essential to remove household food and nutrition insecurity in rural areas. India today has over 65 million tons of wheat and rice in government stores, yet poverty-induced hunger affects 200 million people (Swaminathan 2000). Macroeconomic policies at the national level should be conducive to job-driven economic growth, based on microenterprises supported by microcredit. It is evident that action has to be taken at the policy planning level to implement the above-men-

tioned aims, so that the problem of undernutrition in the Garhwal Himalayas can be combated.

But the first step has to be initiated at the grassroots level by creating awareness among the indigenous population about their current nutritional status, its negative implications on overall well being, and the steps that can be taken to tackle the problem of undernourishment. Hopefully, as the indigenous people of Garhwal gradually become better nourished, they will actively contribute to the process of regeneration of the Himalayan ecosystem.

This study has attempted to give an overall picture of the level of undernourishment that exists among the indigenous population in the Garhwal Himalayas in relation to the agroclimatic situation in the area. It has highlighted only the state of undernourishment, not the processes that have led to this condition. In addition to the nutritional anthropometry applied in this study, diet surveys and clinical and biochemical indicators of malnourishment need to be assessed, along with the incidence of common diseases prevalent in the area, morbidity and mortality rates, and various socioeconomic factors that affect the nutritional status of a community. Only then can comprehensive conclusions be drawn about the state of undernourishment of the people residing in the Garhwal Himalayas.

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REFERENCES

Bamji MS, Thimyamma BVS. 2000. Impact of women's work on maternal and child nutrition. *Ecology of Food and Nutrition* 39(1):13–31.

Bhattarai B. 1998. Poor in the Himalaya. *In:* Singh V, Sharma ML, editors. *Mountain Ecosystems. A Scenario of Unsustainability.* New Delhi: Indus Publishing Company, pp 206–207.

Carlson BA, Wardlaw TM. 1990. *A Global, Regional and Country Assessment of Child Malnutrition.* UNICEF Staff Working Paper No 7. New York: UNICEF [United Nations Children's Fund], pp 148–152.

Chauhan SS, Chauhan DS, Shushma Chauhan. 1999. Nutritional status of tribal children of Rajasthan, India. *Journal of Ecobiology* 1(1):41–45.

Dutta A. 1998a. Victims of unsustainability, health status of Garhwali children. *In:* Singh V, Sharma ML, editors. *Mountain Ecosystems. A Scenario of Unsustainability*. New Delhi, India: Indus Publishing Company, pp 154–159.

Dutta A. 1998b. Environmental degradation and nutritional status of hill people: Some reflections. *In:* Singh V, Sharma ML, editors. *Mountain Ecosystems. A Scenario of Unsustainability*. New Delhi, India: Indus Publishing Company, pp 199–202.

Dutta A, Kumar J. 1997. Impact of sex and family size on the nutritional status of hill children of Uttar Pradesh. *Indian Journal of Nutrition and Dietetics* 34:121–126.

Ferguson EL, Bachou TT, Marks GC. 1997. Environmental and/or genetic determinants of growth among rural adolescents in Uganda. *In:* Fitzpatrick DW, Anderson JE, L'Abbé ML, editors. *Proceedings of the 16th International Congress of Nutrition, 1997.* Montreal, Canada, 27 July–1 August 1997. Ottawa, Canada: Canadian Federation of Biological Societies.

Gomez KA, Gomez AA. 1976. *Statistical Procedures for Agricultural Research.* Los Baños, Philippines: International Rice Research Institute.

Gupta RK. 1983. *Aspects of Environment and Resource Ecology of Garhwal.* The Living Himalayas, Volume 2. New Delhi, India: Today & Tomorrow Printers & Publishers.

Infant RB, Cordeo R. 1997. Status of children population living in Coche Islands. *In:* Fitzpatrick DW, Anderson JE, L'Abbé ML, editors. *Proceedings of the 16th International Congress of Nutrition, 1997.* Montreal, Canada, 27 July–1 August 1997. Ottawa, Canada: Canadian Federation of Biological Societies.

Jodha NS. 2001. Global environmental changes and economic globalization: Old and new resources of risks in mountain areas. *ICIMOD Newsletter* 40:11–12.

Kunwar Rajesh, Pillai PB. 1998. Nutritional status of girl child: A comparative study in primary school children. *Medical Journal of Armed Forces India* 5(4):311–314.

Nandy SN, Rao KS. 2001. Census 2001: Population dynamics of India Himalaya. *Himalayan Ecology and Development* 9(2):1–6.

Negi SS. 1994. *Garhwal: Land and People.* Delhi, India: Indus Publishing Company.

Pant CR, Malla Bhalta, Cross M. 1997. Malnutrition in far western Nepal: Problem and solution. *In:* Fitzpatrick DW, Anderson JE, L'Abbé ML, editors. *Proceedings of the 16th International Congress of Nutrition, 1997.* Montreal, Canada, 27 July–1 August 1997. Ottawa, Canada: Canadian Federation of Biological Societies.

Pascual T. 2001. Overview of a micro-scale study of the causes and effects of landslides in the high Himalaya, Nepal. *ICIMOD Newsletter* 40:4–7.

Pipes PL, Trahms CM. 1993. Nutrition: Growth and development. *In:* Pipes PL, Trahms CM, editors. *Nutrition in Infancy and Childhood.* 5th ed. St. Louis, MO: Mosby, pp 1–29.

Rawat R. 1997. *Return Migration and Rural Development*. Tehri Garhwal, India: Siddhi Publishers.

Singh V, Sharma ML, editors. 1998. *Mountain Ecosystems. A Scenario of Unsustainability.* New Delhi, India: Indus Publishing Company.

Swaminathan MS. 2000. An evergreen revolution. *Biologist* 47(2):85–89.

Swaminathan MS. 2003. Nutrition in the third millennium: Countries in transaction. *In:* Elmadfa I, Anklam E, König J, editors. *Modern Aspects of Nutrition. Present Knowledge and Future Perspectives. International Congress of Nutrition 2001.* The Complete Proceedings of the 17th International Congress of Nutrition, Vienna, 2001. Basel, Switzerland: Karger.

UNDP [United Nations Development Programme]. 2001. *Making New Technologies Work for Human Development: Human Development Report 2001.* New York: Oxford University Press.

Wardlaw GM. 2000. *Contemporary Nutrition.* Boston, MA: Mc Graw & Hill.

WFP [World Food Programme]. 2001. *Enabling Development: Food Assistance in South Asia.* New Delhi: Oxford University Press.

WHO [World Health Organization]. 1995. *Physical Status: The Use and Interpretation of Anthropometry.* WHO Technical Report Series 854. Geneva, Switzerland: WHO.

Yamauchi T, Umezaki M, Ohtsuka R. 2001. Influence of urbanization on physical activity and dietary changes in Huli speaking population: a comparative study of village dwellers and migrants in urban settlements. *British Journal of Nutrition* 85(1):65–73.