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Food practices in contrasting populations: an anthropological study of the Sherpas, Lepchas, Oraons and Mahishyas of West Bengal

Anthropology is generally defined as the study of human variation with respect to biological, cultural and bio-cultural traits, the latter meaning such traits which are determined substantially by both biological and cultural factors and their interaction(s), e.g. fertility. The distinctive characteristic of the anthropological approach is micro-level study, i.e. looking at variations among contiguous or otherwise closely related castes, tribes, communities; among subgroups of these groups; among households or families within these groups; among individuals within these households or families; among different points in time with respect to the same groups, subgroups, household or family, or individual; and so on. The distinctive method of anthropology is detailed and intensive information collection through the investigator's prolonged personal rapport with individual members of the unit of study, as well as personal observation and enquiry about minute details of biological, cultural and bio-cultural phenomena occurring in the study unit, often over a lengthy period of time.

Nutrition as a subject has been defined in various ways. We shall follow the definition given by the Council on Food and Nutrition (1963), which is as follows:

> Nutrition is the science of food, the nutrients and other substances therein, their action, interaction and balance in relation to health and disease, and the process

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by which the organism ingests, digests, absorbs, transports, utilizes and excretes food substances. In addition, nutrition must be concerned with social, economic, cultural, and psychological implications of food and eating.

Obviously, it is in relation to the latter part of this definition that the possible contribution of anthropological approaches and methods can be concretized and the interface between the disciplines of anthropology and nutrition can be most profitably worked out. In more specific terms, the social, economic, cultural and psychological determinants and consequences of variations of food practices among micro-categories of large ecological, regional or political aggregates of people, particularly in respect of health and disease, are precisely the areas in which the contribution of anthropology to nutrition and the interface between the two should be explored.

In view of this, it is the purpose of this article to illustrate, from our recent field studies on several contrasting (with respect to various characteristics) ethnic groups and subgroups, the possible contribution of anthropology to nutrition and the interface between these disciplines. Specifically, findings will be discussed on (1) intake differences between or among subgroups of ethnic groups, (2) intake differences between and within ethnic groups (among subgroups) inhabiting the same region and their health implications, and (3) intake differences among individuals within subgroups, all of which may be of academic and practical importance in nutritional studies but may be missed except in micro-level anthropological studies. Some extant data from other sources will also be referred to in the discussion. These examples are not meant to be exhaustive; instead, they are representative of a vast field of study, which remains inadequately explored to date.

Materials and methods

A multidisciplinary study programme, entitled Human Adaptability Programme, was initiated in the Indian Statistical Institute in early 1976. The short-term objective of the programme was to detect and measure the effects of three sets of factors — physical environmental, socio-cultural and ethnic — on health, as well as of health and activity patterns on the environment, following the recommendations of the International Biological Programme/Human Adaptability (IBP/HA) panel (Weiner, 1969) and the Unesco Man and the Biosphere (MAB) programme (Unesco, 1973). The long-term objective was to determine

the limits to human adaptation. The limits to adaptation were defined in terms of "such aspects as a population's health, ability to feed itself adequately, functional capability in its physical environment and reproductive performance" (Baker, 1984); in short, its capability for demographic survival and physical fitness, including perceived well-being.

Populations and areas

Data were collected on the following population groups and subgroups.

1. *Lepchas*. They are generally believed to be indigenous to the Sikkim–Darjeeling Himalaya (Das, 1978). The present study comprises data on three subgroups of the Buddhist Lepchas inhabiting the vicinity of Kalimpong town in the hill area of northern West Bengal, namely, the urban, the rural developed and the rural less developed. All the subgroups are primarily agriculturists.

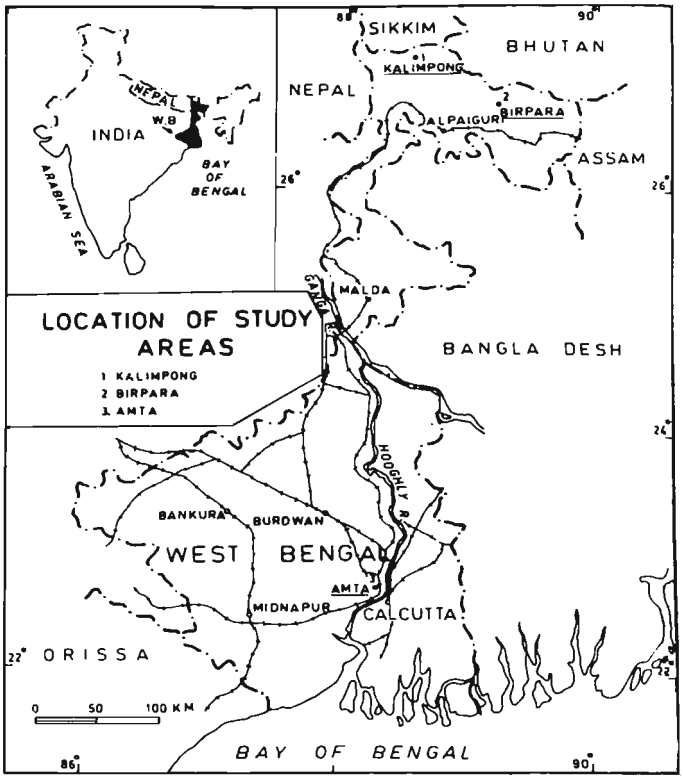
2. *Sherpas*. They are indigenous high-altitude people, an offshoot of the larger Tibetan population which migrated from eastern Tibet to north-eastern Nepal around 1533 (von Fürer-Haimendorf, 1964; Oppitz, 1974), and from there to the Kalimpong area about two hundred years ago (Gupta, 1980). Data were collected on two subgroups of the Sherpas inhabiting the vicinity of Kalimpong town, one practising agriculture and the other plantation labour.

3. *Oraons*. They are a Dravidian-speaking population, and therefore supposed by some to be indigenous to southern India (Dalton, 1872), but are known to have inhabited the Chotanagpur plateau in Bihar for centuries. The present study comprises data on two subgroups of Oraon tea labourers of Jalpaiguri district, northern West Bengal, who have migrated to this new habitat since the end of the last century, i.e. those of Birpara and Dalgaon Tea Gardens.

4. *Mahishyas*. They are an agricultural Hindu caste of the deltaic southern West Bengal. Our data comprise three economic subgroups of the Mahishyas of Chakpota village in the Howrah district. The households of the village were classified into three economic subgroups, namely, "High", "Medium" or "Low", on the basis of annual per capita income, using the cut-off points of US$60 (the conventional "poverty line", see World Bank, 1978) and US$120 (the locally defined "sufficiency line").

The study areas and their climatological and physiographic characteristics are shown in Figure 1 and Table 1, respectively.

FIGURE 1
Map showing location of study areas



Field methodology and types of data

One-day, semi-quantitative data on dietary intakes were collected by the recall method for households as a whole as well as for each individual within the household separately (in the case of the

TABLE I
Meteorological data for the study areas

Area and population	*Altitude (metres)*	*Meteorological data* *Barometric pressure (mm/Hg)*	*Maximum temperature (°C)*	*Minimum temperature (°C)*	*Humidity (%)*
Kalimpong (Sherpa, Lepcha)	*c.* 1200	655	15.5–24.4	7.8–19.3	69–92
Birpara (Oraon)	83	760	20.5–33.3	10.5–25.0	82
Chakpota (Mahishya)	Sea level	760	40.5	13.0–26.0	60–70

Sources: Basu et al., 1984; *District Census Handbook*, 1951a,b.

Mahishyas, Sherpas and Lepchas three-day quantitative surveys were also done). Eight containers of various sizes[1] were shown to the wife or mother (distributor). She was then asked to tell the investigator the amounts of raw food items cooked for the entire household, as well as the amounts of cooked food items given to each member of the household, the previous day in terms of the number of containers of one or more specific sizes. Data were also collected on the views of the wife or mother regarding whether any discrimination in the allocation of food among household members should be made, and, if so, the nature of such discrimination. Data were additionally collected on the sufficiency of individual-wise allocations, taboos observed and special diets given, if any, with respect to various age and sex groups, specific occasions (e.g. pregnancy, nursing), frequency of all household members eating together and so on.

The consumption survey was conducted by a single investigator in each population by house-to-house visits after he had established substantial rapport through prolonged contact. The data obtained from the distributor were cross-checked from various other individuals of the household wherever feasible.

Data

For each household, the consumption data on various food items were converted to nutrient consumptions by means of the standard conversion tables prepared by the Indian Council of Medical

TABLE 2

Basic statistics pertaining to nutrients based on per capita consumption data for population subgroups

Population group and subgroup	*Sample size*	*CALORIE*				*ANMPRO*				*VEGPRO*				*FAT*			
		Min.	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*
Sherpa																	
Agricultural workers	38	1330.4	5909.0	2672.5	945.0	0.0	66.5	8.7	15.2	31.4	167.2	73.1	28.6	2.8	46.5	10.2	9.2
Plantation workers	11	2047.2	4189.4	2796.3	732.2	0.0	75.3	11.7	22.3	49.9	180.9	87.4	39.0	3.8	21.0	8.9	5.1
Lepcha Buddhist																	
Rural: less developed	26	994.8	3268.8	2343.2	610.3	0.0	90.4	15.7	25.1	24.8	96.2	50.7	19.6	2.6	31.5	10.6	8.4
Rural: developed	22	1001.9	3618.0	2155.5	628.6	0.0	56.5	2.6	12.0	27.5	76.2	48.5	14.8	1.8	20.8	5.1	4.3
Urban	20	704.3	3675.8	2537.1	776.2	0.0	75.8	17.4	22.0	15.6	88.6	56.9	20.8	1.5	24.1	7.5	5.6
Oraon																	
Birpara	167	767.5	4835.9	2789.1	786.9	0.0	70.9	5.0	10.4	15.4	133.1	73.0	21.2	1.0	21.9	8.0	3.5
Dalgaon	257	865.0	4462.0	2858.0	788.6	0.0	164.1	6.1	14.9	27.9	200.1	79.3	23.8	1.3	23.3	9.3	3.6
Mahishya																	
High economic group	18	1562.6	3938.2	2412.8	611.0	8.8	50.8	21.8	10.5	30.1	94.7	54.4	15.1	9.0	47.7	18.9	10.4
Middle economic group	19	1378.4	4417.7	2484.0	823.0	0.0	16.4	9.2	5.0	28.9	87.6	56.2	18.4	2.1	19.9	9.1	4.3
Low economic group	25	885.0	3877.0	2042.1	681.2	0.0	13.5	3.2	4.1	19.3	149.3	48.3	25.1	1.1	15.8	5.0	3.8

Research (1981). For each household, using the demographic data, the number of consumption units (CUs)[2] on the day of the survey was also computed. The total nutrient consumption data were then converted to (a) per capita nutrient consumptions, and (b) per CU nutrient consumptions. Only four major categories of nutrients have been considered — calorie (CALORIE), animal protein (ANMPRO), vegetable protein (VEGPRO) and fat (FAT). It may be noted that other nutrients, such as calcium, were not considered because for several food items these values were not available. Nutrient consumption data pertaining to both per capita and per CU have been analysed separately. It may be noted that data per CU are more meaningful for CALORIE (because CUs are computed taking into account the recommended dietary allowance [RDA] for calory only); however, the per capita data may be more meaningful for other nutrients. However, for purposes of population comparisons, the per CU data are perhaps more useful since these are standardized with respect to the demographic structure of the household, while the per capita data are not. In any case, for completeness, we present results of analyses of both these data sets.

Some comments on the limitations of the data analysed here may be pertinent. First, the sample sizes for all subgroups, except for the Oraon subgroups, are fairly small. As a consequence, statistical tests of normality could not be performed (except in the case of Mahishyas among whom a statistical sampling was done). Second, the households from which data were obtained were not randomly sampled, but comprised those households which co-operated. Third, the data having been collected on a single day are subject to large random fluctuations.[3] Moreover, leftovers (from the previous day or to the succeeding day) were not taken into account, which may have further contributed to random fluctuations.

Results

The sample size and basic statistics (minimum, maximum, mean and standard deviation) of each nutrient for each population subgroup are presented in Tables 2 and 3, pertaining to, respectively, per capita and per CU data. In respect of mean energy intake, the Sherpas and Oraons seem to be better-off than the other populations. In respect of the intakes of other nutrients also, these two groups are, by and large, better off.

TABLE 3
Basic statistics pertaining to nutrients based on per CU data for population subgroups

Population group and subgroup	*Sample size*	*CALORIE*				*ANMPRO*				*VEGPRO*				*FAT*			
		Min.	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*	*Min.*	*Max.*	$\bar{X}$	*SD*
Sherpa																	
Agricultural workers	38	1708.8	6385.9	3268.2	1028.0	0.0	74.4	10.3	17.3	40.4	179.8	89.3	31.4	3.5	52.1	12.4	10.3
Plantation workers	11	2375.0	4573.6	3391.7	734.7	0.0	81.6	13.3	24.1	57.9	197.5	105.5	40.7	5.0	23.1	10.7	5.6
Lepcha-Buddhist																	
Rural: less developed	26	1344.4	4043.7	2874.9	725.6	0.0	101.1	18.4	28.9	29.1	123.4	62.6	24.8	3.5	34.4	12.7	9.4
Rural: developed	22	1261.8	4698.7	2772.2	783.2	0.0	63.1	2.9	13.4	34.7	96.7	62.3	18.4	2.3	25.5	6.5	5.2
Urban	20	1043.5	5217.6	3221.5	1036.8	0.0	88.9	21.7	26.7	23.1	112.0	72.1	26.5	1.9	30.1	9.4	6.7
Oraon																	
Birpara	167	894.5	5828.4	3581.6	1008.6	0.0	104.3	6.4	13.7	18.0	230.5	93.8	28.1	1.1	27.5	10.2	4.4
Dalgaon	257	1156.0	5179.7	3550.9	912.3	0.0	211.0	7.5	18.4	34.2	253.3	98.7	28.4	1.7	31.0	11.6	4.4
Mahishya																	
High economic group	18	2077.9	4400.3	2912.5	573.4	12.8	65.6	26.5	13.0	40.0	105.8	65.6	14.5	10.3	47.6	22.3	10.2
Middle economic group	19	1905.6	4936.0	3018.4	885.8	0.0	20.2	11.2	6.2	40.0	114.3	68.5	20.8	2.8	24.8	11.1	5.1
Low economic group	25	1120.2	4331.8	2489.9	710.4	0.0	17.1	4.1	5.1	26.9	166.8	58.6	26.8	1.4	20.1	6.2	4.5

Intake differences between and among subgroups of ethnic groups

Among the Oraons, the Dalgaon subgroup has higher intakes of all nutrients than the Birpara subgroup. Among the Lepchas and Mahishyas, there does not seem to be a consistent relationship of nutrient intakes with economic development or urbanization. (The quantitative dietary data, however, show a positive relationship between nutrient intakes and economic conditions among the Mahishyas, see Majumder et al., 1985.)

In order to check whether the subgroups of the various population groups are indeed statistically similar in respect of nutrient intakes, we computed the Wilks's lambda value to test the null hypothesis of equality of the mean vectors of nutrient intakes for the subgroups of each population group. The significance of Wilks's lambda values was judged by using an approximate *F*-test (Rao, 1973). These results are presented in Table 4, which shows that, except for the Sherpas, the

TABLE 4
Results of multivariate analysis of variance between subgroups of each population group

		Per capita			*Per consumption unit*		
			F-statistic			*F-statistic*	
Population group	*Subgroups compared*	*Wilks's lambda*	*Value*	*d.f.*	*Wilks's lambda*	*Value*	*d.f.*
Sherpa		0.830	2.255	4,44	0.832	2.224	4,44
	Agricultural workers						
	Plantation workers						
Lepcha-Buddhist		0.766[a]	2.208	8,124	0.754[a]	2.352	8,124
	Rural: less developed						
	Rural: developed						
	Urban						
Oraon		0.945[a]	6.102	4,419	0.947[a]	5.811	4,419
	Birpara						
	Dalgaon						
Mahishya		0.366[a]	9.153	8,112	0.354[a]	9.518	8,112
	High economic group						
	Middle economic group						
	Low economic group						

Wilks: lambda significant at the 5 per cent level.

TABLE 5

Results of stepwise discriminant analysis: variables useful for discrimination and classification functions

Population group and subgroups compared	*Type of data*	*Classification function*[a]
Lepcha-Buddhist		
Rural: less developed	Per capita	0.254 (FAT) – 2.448
	Per CU[b]	0.227 (FAT) – 2.547
Rural: developed	Per capita	0.122 (FAT) – 1.413
	Per CU	0.116 (FAT) – 1.477
Urban	Per capita	0.179 (FAT) – 1.770
	Per CU	0.168 (FAT) – 1.887
Oraon		
Birpara	Per capita	0.637 (FAT) – 3.232
	Per CU	0.004 (CALORIE) + 0.009 (VEGPRO) + 0.046 (FAT) – 7.810
Dalgaon	Per capita	0.743 (FAT) – 4.145
	Per CU	0.003 (CALORIE) + 0.028 (VEGPRO) + 0.129 (FAT) – 7.921
Mahishya		
High economic group	Per capita	0.474 (ANMPRO) – 6.268
	Per CU	0.251 (ANMPRO) + 0.342 (FAT) – 8.241
Middle economic group	Per capita	0.200 (ANMPRO) – 2.016
	Per CU	0.091 (ANMPRO) + 0.188 (FAT) – 2.652
Low economic group	Per capita	0.070 (ANMPRO) – 1.212
	Per CU	0.013 (ANMPRO) + 0.125 (FAT) – 1.510

[a]The order in which the variables appear in the classification functions is the order in which the variables were entered in these functions.
[b]CU = Consumption unit.

subgroups of every other population group are significantly different in respect of nutrient intakes. This conclusion holds both in respect of the per capita and the per CU data.

Having discovered that subgroups within the various population groups are significantly different, a pertinent question that arises is: are all the nutrient variables important for purposes of discriminating between subgroups of a population or are the subgroups discriminable only by a subset of these variables? To answer this question, we performed a Stepwise Discriminant Analysis within each population group. In this analysis the (sub)set of variables useful for discrimination is identified, and linear functions of these variables are formed based on which discrimination can be done. The order of entry of the variables in the linear discriminant function is in order of importance of the variables for purposes of discrimination. Results of the Stepwise Discriminant Analysis are presented in Table 5 for all populations except the Sherpas (for which the subgroups are not significantly different). From Table 5 it can be seen that only one variable, FAT, is a significant discriminator of the subgroups of Lepcha-Buddhists. This is true both in respect of the per capita and the per CU data. Among the Oraons, the same variable, FAT, is the significant discriminator between Birpara and Dalgaon subgroups when the analysis is done on per capita data. However, when the analysis is based on per CU data, FAT is the least important discriminating variable; CALORIE and VEGPRO, in that order, are more important discriminators. A similar but smaller discrepancy between the results based on per capita and per CU data is also observed among the Mahishyas. ANMPRO is unequivocally the most important discriminator between the economic subgroups, and is the only significant discriminating variable based on per capita data. However, based on the per CU data, FAT also seems to contribute significantly to the discriminating ability. On the whole, the discriminant or classification functions based on the per CU data involve a greater number of variables than those based on the per capita data. The implication of this is, however, not readily clear. It is interesting that different sets of variables are involved in the ability to discriminate between subgroups of the different populations.

The next question that arises is: how well can one discriminate among the subgroups? In other words, given the nutrient intake(s) corresponding to the variable(s) involved in the discriminination analysis for a household from a particular population, how well can we predict to which subgroup this household belongs? To answer this, we performed a "jack-knifed" classification (using the classification

functions presented in Table 5) of the households of the various population groups. The results are presented in Tables 6, 7 and 8. From these tables it can be seen that for the Lepcha-Buddhists the ability to predict subgroup membership of a household based on nutrient intakes, as judged by the overall probability of correct classification, is fairly low — slightly above 0.4. A more careful examination shows that the subgroups overlap in respect of nutrient

TABLE 6
Results of jack-knifed classification for Lepcha-Buddhist population

Actual subgroup	*Per cent correctly classified*	*Number of households classified into subgroup*		
		Rural: less developed	*Rural: developed*	*Urban*
Rural: less developed	34.6	9	9	8
	(38.5)	(10)	(10)	(6)
Rural: developed	72.7	3	16	3
	(72.7)	(3)	(16)	(3)
Urban	15.0	6	11	3
	(15.0)	(7)	(10)	(3)
Total	41.2	18	36	14
	(42.6)	(20)	(36)	(12)

Note: Figures not in parentheses are based on per capita consumption data; figures in parentheses are based on per CU consumption data.

TABLE 7
Results of jack-knifed classification for Oraon population

Actual subgroup	*Per cent correctly classified*	*Number of households classified into subgroup*	
		Birpara	*Dalgaon*
Birpara	64.1	107	60
	(59.9)	(100)	(67)
Dalgaon	51.0	126	131
	(56.8)	(111)	(146)
Total	56.1	233	191
	(58.0)	(211)	(213)

Note: Figures not in parentheses are based on per capita consumption data; figures in parentheses are based on per CU consumption data.

TABLE 8
Results of jack-knifed classification for Mahishya population

Actual economic subgroup	*Per cent correctly classified*	*Number of households classified into subgroup*		
		High	*Middle*	*Low*
Low	84.0	21	4	0
	(84.0)	(21)	(3)	(1)
Middle	63.2	6	12	1
	(68.4)	(5)	(13)	(1)
High	66.7	0	6	12
	(66.7)	(0)	(6)	(12)
Total	72.6	27	22	13
	(74.2)	(26)	(22)	(14)

Note: Figures not in parentheses are based on per capita consumption data; figures in parentheses are based on per CU consumption data.

intakes (see Tables 2, 3 and 6). The predictive ability increases to about 0.55 for Oraons and to about 0.7 for Mahishyas. Thus, even one single variable (FAT for Oraons and ANMPRO for Mahishyas) is a successful predictor of group membership in these two populations. It can also be seen from these tables that, while the number of variables in the classification function derived from the per CU data is higher both for Oraons and Mahishyas, the discriminating ability does not increase much by use of the extra variables.

The results of our study on the quantitative dietary data from the Mahishyas has already been reported (Majumder et al., 1985), and therefore are only briefly recapitulated here. The analysis of variance shows that for every nutrient there are significant variations among the three economic subgroups, that for most nutrients (calorie, animal protein, fat, carbohydrate, calcium, vitamin A, vitamin B_2, minerals, phosphorus, nicotinic acid) the maximum proportion of total variation is attributable to differences among economic subgroups, and that in general calorie and phosphorus are the two most important variables for discrimination. Thus, if consumption of the discriminating items for a particular household was known, then we could predict to which economic group the household belonged with high probability, especially in the cases of "Low" and "High" economic subgroups. Misclassification to the immediately adjacent subgroups was much more probable than to the one further apart (see Table 9).

TABLE 9
Classification results for Mahishya population: actual and predicted economic group membership

Actual group	*Number of households*	*Number of observations per household*	*Total number of observations*	*Predicted group membership*		
				High	*Middle*	*Low*
High	74	3	222	173 (77.9)	49 (22.1)	0 (0.0)
Middle	104	3	312	84 (26.9)	193 (61.9)	35 (11.2)
Low	63	3	189	3 (1.6)	38 (20.1)	148 (78.3)

Note: Figures in parentheses indicate percentages.

Intake differences between and within ethnic groups (among subgroups) inhabiting the same region and their health implications

Despite the academic interest of studying the micro-differences among ethnic groups, subgroups, individual members within a household and different occasions in an individual's life-cycle, one may question the practical utility of such studies in the field of community nutrition. Two examples of such utility from our recent studies follow.

First, let us look at the differences in nutrient (calorie, animal and vegetable proteins) intakes among the three economic subgroups of the Mahishyas of Chakpota as estimated from the three-day weighment survey data (Majumder et al., 1985) presented in Table 10. When one considers the economic subgroup-specific child growth curves for body weight (Figure 2) in the context of the differential nutrient intakes, the possible role of calorie-intake differentials on child health (body weight curves are treated as examples) even within a single village population, and the need for a micro-level approach in applied nutrition programmes, clearly emerges, especially in the case of male children. However, the practical feasibility of such an approach may be doubted because undertaking such micro-level surveys on any extensive scale will require enormous technical manpower and resources which may not be readily available. Application of the results of such surveys through micro-level planning will also require considerable manpower and resources.

Second, let us turn to the differences in intakes of the same nutrients between the Sherpas and Lepchas inhabiting adjoining villages around

TABLE 10
Calorie and protein intakes among the Sherpas, Lepchas and Mahishyas (three-day weighment survey data)

Ethnic group	*Calorie* ($\bar{X} \pm \sigma$)	*Proteins*	
		Animal ($\bar{X} \pm \sigma$)	*Vegetable* ($\bar{X} \pm \sigma$)
Sherpa ($n = 49$)	3017.12 ± 673.8	24.06 ± 13.44	61.30 ± 16.87
Lepcha ($n = 26$)	3571.86 ± 1230.03	24.83 ± 16.49	86.60 ± 31.85
Mahishya: economic groups:			
High ($n = 63$)	3747.17 ± 571.65	21.63 ± 9.39	75.87 ± 14.66
Middle ($n = 104$)	2924.48 ± 429.60	7.58 ± 6.47	68.68 ± 11.77
Low ($n = 74$)	2430.32 ± 335.62	4.07 ± 4.17	58.44 ± 10.66

Kalimpong town also shown in Table 10. Considering the child growth curves for body weight in relation to the nutrient intakes, it appears that the Lepcha curves are only slightly higher than the Sherpa ones except in the twelve to fifteen years age group in males (Figure 3). In fact, considering the standard errors it appears that the Lepcha curve lies within the range of one standard error unit from the data points of the Sherpa curve in general (this is true for stature as well), indicating that the nutrient intake differences between the two populations do not seem to make an impact on this health trait, thereby emphasizing another important anthropological concern, namely that regarding the adaptability of human populations to various environmental fluctuations.

Intake differences among individuals within a household

The results of our studies on this topic are also reported in detail elsewhere (Basu et al., 1986) and therefore are only briefly recapitulated here.

Our data relate to the ranking of individuals within the household in terms of the intake variable defined for this study, that is the difference between actual intake and RDA. The actual intakes were estimated from the one-day, semi-quantitative diet survey mentioned in a preceding section. The age- and sex-specific RDA per day proposed by the ICMR (1981) were used. This analysis was based on calories only.

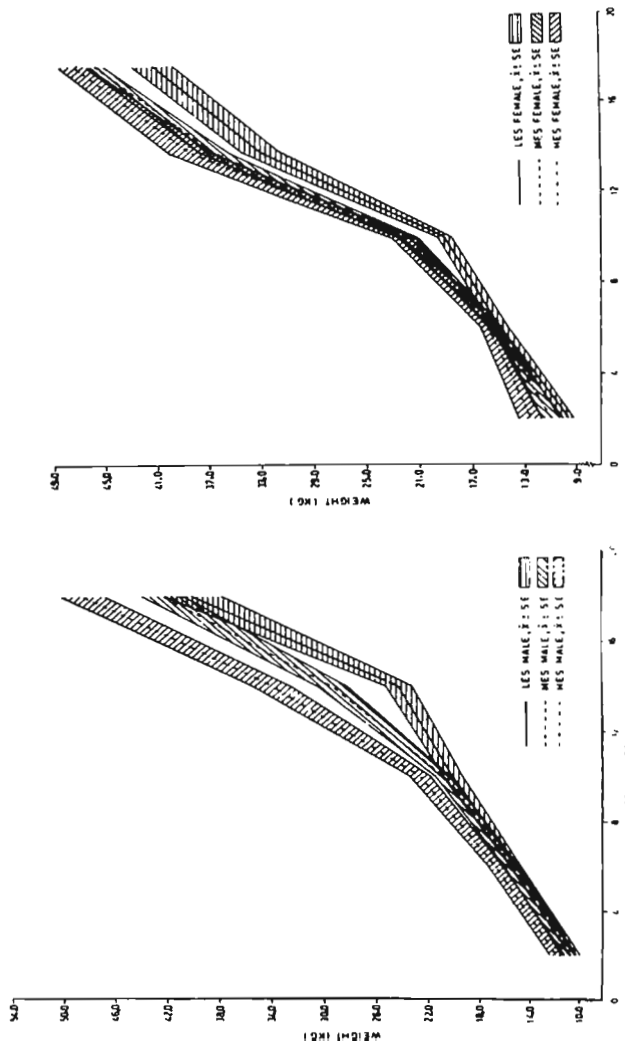


FIGURE 2
Economic subgroup-specific growth curves for body weight (left) male; (right) female

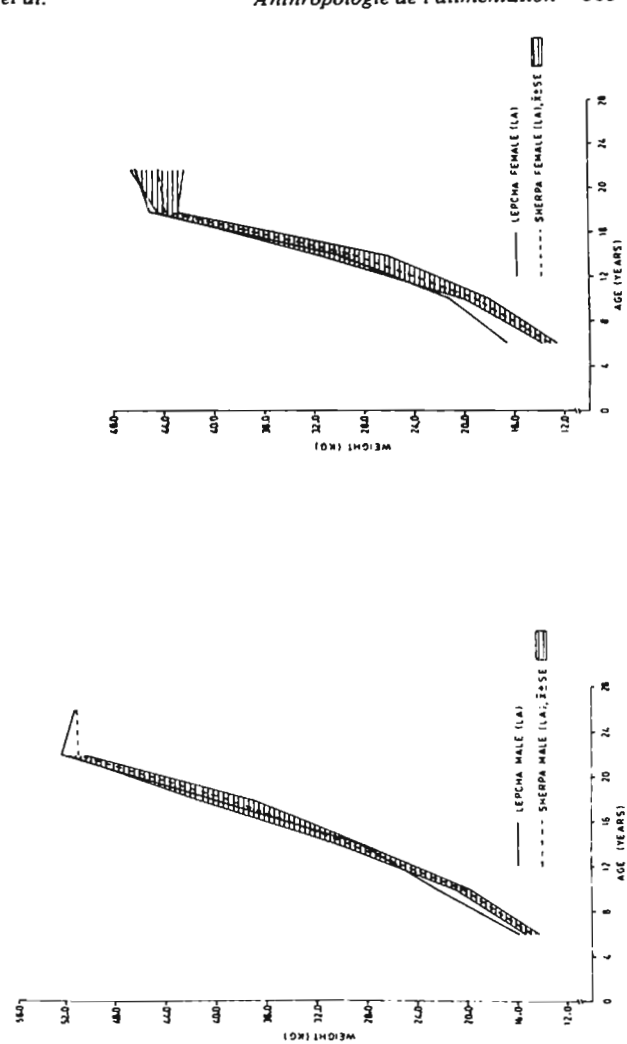


FIGURE 3
Ethnic group-specific growth curves for body weight (left) male; (right) female

The results of our study show that in two subgroups, the "Middle" and "Low" economic subgroups of the Mahishyas, there is no inequality of food distribution among members within a household; that is, each member received food (calories) equal or proportional to his or her need (the *F*-values were non-significant) the need being defined in terms of the age- and sex-specific RDA. In all other groups and subgroups, however, the *F*-values were significant, indicating significantly unequal or inequitable intra-household food distribution. As to the nature of unequal or inequitable distribution, among all the Lepcha subgroups females occupy three of the upper four (and males three of the lower four) intake ranks, irrespective of rural/urban and religious differences, indicating a consistent female bias; among the two Sherpa subgroups, the pattern is less clear, with both the husband and wife occupying positions among the four lower ranks, indicating perhaps that they sacrifice their shares in favour of others, particularly other adult members of the household. Among the Oraons, no sex bias seems to exist, males and females being evenly distributed in the four upper and four lower ranks. Among the Mahishyas of the "High" economic subgroups only a clear male bias, with three of the upper four ranks being occupied by males and the uppermost by the household head, typical of the traditional Hindu system, appears to exist.

Conclusion

Contribution of anthropology to nutrition

The examples from research discussed above clearly show that the approach and method of anthropology can make important contributions to the field of nutrition by detecting and evaluating micro-level differences in food intakes within ecological, regional and ethnic groups, among their constituent subgroups, as well as the relevance of these differences in respect of population health status and human adaptability. The recognition of these differences, and their relevances which may not generally constitute integral parts of traditional studies in community nutrition, may lead to the formulation of more realistic and effective nutrition and health programmes, or in the very least make the nutritionist aware of the possible limitations of his programmes.

Several studies have shown micro-level differences in intakes within

the household both on the normative level (Indra, 1955) and in actual fact (Levinson, 1974; Gulati, 1978; Chen et al., 1981; Miller, 1981; Wheeler, 1982; Batliwala, 1983; Sen and Sengupta, 1983; Douglas, 1984 and others). There is one finding reported by both Sen and Sengupta (1983) and ourselves that may be cited as a striking example of how the anthropological approach and method can be useful to applied community nutrition programmes in a tradition-bound society: results from both studies show that a bias against females operates in the rural Hindu society of West Bengal in such a manner that implementation of nutrition programmes or improvement of economic conditions does not automatically improve the chances of better nutrition for all categories of individuals, and may succeed only in magnifying the disparity between the sexes. The lesson to be learnt from this finding is obvious: a nutrition programme that involves providing a group with adequate foodstuffs or improved purchasing power may be an exercise in futility in the absence of any socio-political pressure to change the traditional value system relating to relative food entitlement among and within households, and to the small-scale local power structure in a community. This has already been pointed out briefly by Douglas (1984).

Interface between anthropology and nutrition

So far we have discussed the contribution of anthropology to nutrition but the converse, which in conjunction with the former will constitute the interface (interaction), is less easy to concretize. A research approach where the converse situation would obtain can be thought of, but no specific examples can readily be cited. For instance, several studies have shown intake differentials among groups, subgroups or individuals within a household but the question has not been posed as to the extent to which the deficient group, subgroup or individual can improve the efficiency of its physiological system so as to reach the level of the better-fed group, subgroup or individual in respect of chances of survival and physical fitness. The nutritionist could answer this question by using his methods of biochemical assays of, for instance, blood protein and lipid levels, measures of physical and physiological fitness, and so on, thereby widening the scope of the anthropological approach to the study of an individual's or a population's built-in capacity to adapt to wide ranges of variation in respect of diverse environmental, including nutritional, conditions.

Some examples have been cited, mainly from our own ongoing studies to show how the anthropological approach and the method of micro-level study and intensive data collection through personal observation can contribute to the discipline of nutrition and, less clearly, the converse situation and the interface between the two disciplines. The examples are cited only to emphasize that there lies a vast field of overlapping areas and interests between the two disciplines which may possibly be profitably explored by collaborative studies to some practical advantages in formulating, implementing and evaluating community nutrition programmes, especially in countries of the Indian region, and perhaps the Third World in general, with their vast and intricate physical environmental and socio-cultural diversities.

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Notes

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1. The container sizes were as follows (in ml): no. 1, 3000; no. 2, 2000; no. 3, 1250; no. 4, 700; no. 5, 450; no. 6, 300; no. 7, 175; no. 8, 100.

2. A consumption unit (CU) is defined as follows: the recommended calorie need of an adult male doing moderate work (i.e. 2800 calories) is taken as one CU. For a

given individual in a household the CU is computed as the ratio of his/her recommended calorie need and 2800 calories. For example, the need of an adult female moderate worker is 2200 calories. Hence, she is taken as 2200/2800 = 0.79 CU.

3. Several methods are followed for conducting dietary surveys. (1) Weighing method: each food item to be consumed on a certain day is actually weighed, its nutrient (calorie, protein, etc.) contents are estimated using standard conversion tables and these are summed over all items. Depending on the time available for the survey, the weighment is done for one day, or three or even seven consecutive days, the latter to reduce random intake fluctuations. (2) Qualitative (recall) method: the respondent is asked to recall the food items consumed during the preceding one or more days and the recalled data are recorded. The amount of each item consumed is not recorded. (3) Semi-quantitative (recall) method: the respondent is asked to recall the amount of each item consumed during the preceding one or more days. This method gives an approximate idea of the quantities consumed. The nutrient contents are estimated as in the case of (1).

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