Chapter 10

The Bhil food system: links to food security, nutrition and health

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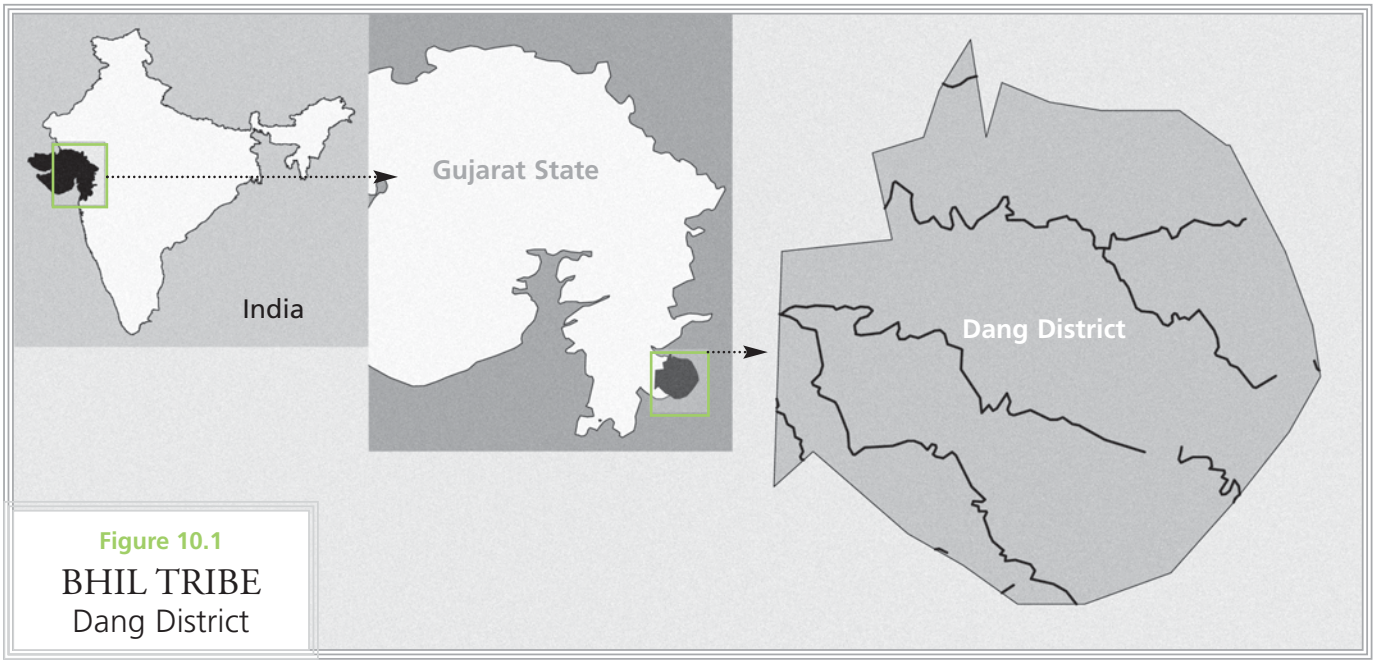

Figure 10.1
BHIL TRIBE
Dang District

Data from ESRI Global GIS, 2006.
Walter Hitschfield
Geographic Information Centre,
McGill University Library.

1
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"Thank you Mother for the food that you've given us!"

Bhil saying

Abstract

The Bhils of India are a good example of an Indigenous People with diversity in their culture, tradition and environment. The Bhil study undertaken in collaboration with Child Eye Care Charitable Trust is part of 12 case studies addressing a commitment to research into areas of nutrition and health, with an emphasis on the impact of food environments on health of Indigenous Peoples. Employing community-based participatory research methods, the Bhil traditional food system was documented, pointing to the use of 94 foods – including a variety of plants, small domestic animals and local fish – with preparation and processing methods unique to the Bhil culture.

Dietary assessments showed that for children and mothers the percentage of energy from local cultivated and wild indigenous foods was 68 percent for children and 59 percent for women. A particular point of concern is that although drumstick and fenugreek leaves have high carotene content and are readily available in the community, only 1 percent of the study group consumed them. In fact, several micronutrient-rich traditional foods were infrequently consumed.

The dietary energy and protein intakes of most pregnant women and pre-school children did not meet Indian Recommended Dietary Allowances. Women and children were short in stature with low body weights, consistent with malnutrition, according to National Centre for Health Statistics standards.

A directory of Bhil foods has been developed in collaboration with the community. Improvement of food security, nutrition and health with implications for community-friendly policies and programmes are expected to be direct outcomes of the study.

Introduction

Understanding the food systems of Indigenous Peoples and improving or strengthening these systems in the context of nutrition and health pose unique challenges. It is well recognized that traditional foods and dietary diversity within an ecosystem can be powerful sources of nutrients and, thus, better health. In view of their habitat and dietary habits, Indigenous Peoples often distinguish themselves from other population groups. Their food patterns are influenced by environmental constraints and vary from extreme deprivation in lean seasons to high levels of intake of several foods during harvest and post-harvest periods. Tribal food-related practices and patterns are highly influenced by their traditions and environment; consequently, understanding the wide diversity of food systems of Indigenous Peoples and improving and strengthening these systems in the context of nutrition and health merit attention.

Hundreds of tribes exist in different parts of India, a good example of indigenous populations with a vast diversity in their cultures, traditions and environments. There is a rich habitat of natural foods in Indian tribal environments that need to be used to promote food security, nutrition and health. However, challenges of geography, agricultural technology, cultural habits, lack of formal education, poor infrastructure, including health care facilities, and poverty lead to development of poor nutrition and health. This chapter provides a case study of the Bhil tribe from the Dang district, in Gujarat, western India (Figure 10.1). The Bhils occupy a large territory, and inter-regionally they are known as a diverse group.

Cultural and economic background

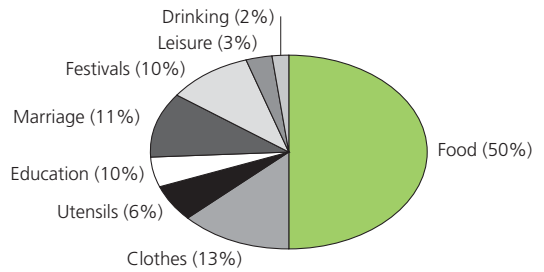
Dang is the smallest and poorest district of Gujarat State, in the Sahyadri mountain range, with a population of 38 500. It is traditionally known as "Dandak" or "Dandkarnya" which is mentioned in the Ramayana, the ancient Sanskrit epic. Only 6 percent of the district includes the non-tribal population. There are predominantly five different tribes: the Bhils, Kolchas, Kotwalias, Kuknas and Warlis. The Bhils form 30 percent of the total population of tribes, with around 11 500 people in 53 villages. The word "Bhil" is derived from the Dravidian word "Billoo" meaning bow and arrow. As a community they are strong people, known to be honest and experts in the use of bow and arrow. They are traditionally linked to the Rajputs (warrior clan of central India), and are the largest modern tribal group in India with substantial communities in Gujarat, Madhya Pradesh, Rajasthan and Maharashtra. Fifty-five percent of Bhils is male and 45 percent is female. On average, 15 percent of males are educated up to seventh to tenth standard (high school), 20 percent are educated up to third to fourth standard (primary level) and 65 percent are illiterate. Among females, 10 percent are educated up to seventh to tenth standard, 15 percent are educated up to third to fourth standard and 75 percent are illiterate.

For six months of the year, 30–40 percent of Bhils migrate to neighbouring areas in Maharashtra for employment in sugar factories or mango orchards. Around 25 percent earn an annual income of approximately Rs21 000 (about US$500). Approximately 60 percent of Bhils live in poverty, and most live in mud hut homes. Fishing and forest hunting are common.

Of total income, about 50 percent is spent on food, 13 percent on clothes, 6 percent on purchase of utensils, 5 percent for education, 11 percent on marriage, 10 percent on celebration of festivals, 3 percent on leisure and 2 percent on drinking, smoking, etc. (Bhattacharjee *et al.*, 2002) (Figure 10.2).

Girls usually marry at 14–15 years of age and boys marry at 15–16 years of age. Teenage pregnancies are very common, with an interval between two pregnancies at around 12 to 14 months. Tribals have preferences

Figure 10.2 Percent distribution of Bhil family spending



for both male and female children. If they only have one-sex children, they continue having children until they have both male and female children. However, young tribals are now seen to be having only two to three children.

As a move towards women's empowerment, the Child Eye Care Charitable Trust (CECCT) has initiated the revival of the "Vavli" system that was earlier practised among the Bhil women. This system is an age-old tradition where the girl, once married, identifies a plot of land (quarter to half acre) near a perennial water source. Here she can grow seasonal vegetables and sell them in the market. The money earned belongs to her and cannot be claimed by her husband, according to protocol. Women usually buy food, ornaments or clothes with this money. The CECCT initiated this practice in one village and it is now is being extended to all 53 villages.

Child Eye Care Charitable Trust (CECCT)

The CECCT, based in Mumbai, has been involved extensively in support and development of tribal health care in various states in India. The Dang district is a key location where CECCT is actively involved in providing and facilitating holistic health care and support to tribals. CECCT works with 60 villages in Dang District, 53 of which are populated with Bhils. In each village, the staff of CECCT consists of two organizers, one health worker and two facilitators. The mission of CECCT is to improve child survival and child eye care through an integrated eye care programme, and health and nutrition-related interventions.

Table 10.1 Bhil traditional food *(95 species/varieties)*

	Scientific name	*English/common name*	*Local name*	*Seasonality*	*Preparation*
	Cereals				
1	*Amaranthus paniculatus*	Amaranth	rajkeera	–	–
2	*Eleusine coracana*	Ragi or Finger millet or African millet	naglano	March–June	Roti, bhakri
3	*Oryza sativa*	Rice (hand pounded)	chokha	January–December	Cooked
4	*Panicum miliaceum*	Common or Proso millet	varai	October–January	Cooked
5	*Pennisetum typhoideum*	Pearl millet	bajra	–	Rotli
6	*Sorghum vulgare*	Sorghum	jowar	April–August	Rotli, gruel
7	*Triticum aestivum*	Wheat	gahoo	January–December	Rotli, gruel
8	*Zea mays*	Maize or Corn	makka	August	Roasted or as such
9	–		kharai	August	Roti, bhakri
	Fish and seafood				
1	*Carcharias* sp.	Shark	khari fish	–	Curry
2	*Coilia dussumieri*	Mandeli	mandli	November–June	Steamed with egg plant and potato
3	*Elops saurus*	–	river fish	June–September*	Curry
4	*Harpodon nehereus*	Bombay duck	bubla	–	Steamed, fried with vegetables
5	*Paratephusa spinigera*	Crab	karachala	June–December	Curry
6	*Thaleichthys pacificus*	–	small fish fry	–	–
7	–	–	bodiya river fish (ravas)	June–September*	Curry
8	–	–	kokil zinga fish	June–September*	Fried or curry
9	–	–	muru fish	June–September*	Curry with vegetables
	Vegetables				
1	*Abelmoschus esculentus*	Lady's finger	bhindi	August–September	Vegetable curry
2	*Agaricus bisporus*	Mushroom	kukkagodugu	July–August	Curry, dry vegetable
3	*Amaranthus spinosus*	Prickly amaranth	matla bhaji	June–September*	Boiled vegetable
4	*Asparagus racemosus*	Asparagus leaves	satavari	Year–round	Boiled vegetable
5	*Bambusa arundinacea*	Bamboo	bamboo	June–September*	Pickled, boiled
6	*Carissa carandas*	–	karonda	April–July*	Curry
7	*Chlorophytum tuberosum*	–	ugat phylli	August–September	Vegetable curry
8	*Cicer arietinum*	Bengal gram leaves	chana bhaji	November–March	Vegetable curry
9	*Cucurbita maxima*	Red pumpkin	lal bhopla	October–December	Boiled vegetable, fried
10	*Dalbergia latifolia*	–	sisam	March–May*	Semi-liquid preparation
11	*Dictyophora* sp.	Bamboo mushroom	vasarta	June–July	Dried, curry
12	*Lagenaria vulgaris*	Bottle gourd	dudhi	January–December	Vegetable curry
13	*Momordica charantia*	Bitter gourd	karela	June–September	Vegetable curry
14	*Moringa oleifera*	Drumstick	saragvani sing	January–June	Vegetable curry
15	*Phaseolus coccineus*	Scarlet runner beans	lili papadi	October–January	Vegetable curry
16	*Solanum melongena*	Eggplant or brinjal	baingan	January–December	Curry
17	*Tectona grandis*	–	teakwood leaves	April	Curry
18	*Trigonnella foenum graecum*	Fenugreek	methi	November–February	Vegetable curry

Continued

Table 10.1 *(continued)* **Bhil traditional food** *(95 species/varieties)*

	Scientific name	*English/common name*	*Local name*	*Seasonality*	*Preparation*
19	–	Elangve leaves	–	March–May*	Boiled vegetable
20	–	–	loti	June-September*	Bhaji
21	–	–	mokha	December-February	Curry
22	–	–	sag tree	June-September*	Bhaji
23	–	–	terani bhaji	June-September*	Bhaji, dry with dhal
	Meat and meat products				
1	*Bos Taurus*	Cow	gai	June-September*	Roasted, curry
2	*Capra hyrchusb*	Goat	bakri	January–December	Curry
3	*Lepus capensis-Leporidae*	Rabbit	sasboo	December–April	Curry
4	*Rattus norvegicus*	Rat	onder	November–March	Roasted
5	*Sus scrofa*	Wild pig	jungli bhund	November–August	Boiled, roasted, curry
6	*Varanus flavescens* (yellow) or *Varanus bengalensis*	Monitor lizard	–	Year–round	Curry
	Poultry				
1	*Columbia livia intermedia*	Pigeon	kabotar	March–May*	Boiled and roasted
2	*Gallus bankiva murghi*	Hen fowl	murghi	March–May	Curry
3	*Haliastar spherus*	Whistling kite	samadi	March	Curry
4	*Picoides pubescens*	Downy woodpecker		March	Curry
5	*Psittaciformes*	Parakeet, parrot	popat	March	Curry
6	*Strigidae*	Owl	ghuvad	March	Curry
7	–	–	chakvat	March	Curry
8	–	–	titar	March	Curry
	Fruits, nuts and seeds				
1	*Achras sapota*	Sapodilla fruit	chiku	November–March	Fresh, ripe
2	*Aegle marmelos*	Bael fruit or wood apple	billa	November–December	Fresh, ripe, chutney
3	*Annona reticulata*	Bullocks heart	ramphala	March–May	Fresh, ripe
4	*Annona squamosa*	Custard apple or sweetsop	seetaphel	August–September	Fresh, ripe
5	*Artocarpus heterophyllus*	Jackfruit	phanas,	April–September	Fresh, ripe
6	*Bassia longifolia*	Mahua	mahvoda	June	Flowers used for making wine, dry seeds
7	*Bassia latifolia*	–	doli mahuda	–	Oil
8	*Carica papaya*	Papaya	papeeta	January–December	Fresh, ripe
9	*Cordia rothai*	Gumberry	gunda	March–May*	Pickle, chutney
10	*Emblica officinalis*	Indian gooseberry	amla	February–May	Chutney
11	*Ficus racemosa*	Wild fig	umbara	February–May*	Chutney, raw
12	*Guizotia abyssinica*	Niger karsani	–	–	–
13	*Lycopersicon esculentum*	Tomato	tomato	January–December	Boiled, in dhal
14	*Magnifera indica*	Mango, ripe	aam	February–May	Fresh, ripe
15	*Psidium guajava*	Guava	jamrookh	October–January	Fresh, ripe
16	*Syzygium cumini*	Indian black berry	jamboo	May–June	Fresh, ripe

Continued

Table 10.1 *(continued)* **Bhil traditional food** *(95 species/varieties)*

	Scientific name	*English/common name*	*Local name*	*Seasonality*	*Preparation*
17	*Zizyphus jujuba*	Indian jujube	bore	October–January	Fresh, ripe
18	–	–	kakad	February–March	Pickle
	Pulses and legumes				
1	*Cajanus cajan* (2 var.)	Red gram dhal (tender pods, dry seeds)	tuver	January–December	Dhal
2	*Dolichos biflours*	Horse gram	kulad	April-June*	Boiled, steamed
3	*Dolichos lablab*	Field bean	val papdi	Winter	Fried, steamed
4	*Glycine max merr.*	Soybean	soyabean	January–December	Boiled, vegetable
5	*Lens esculenta*	Lentils	masoor	January–December	Dhal, boiled
6	*Phaseolus aureus Roxb* (2 var.)	Green gram, whole seeds, split seeds	moong	January–May	Dhal
7	*Phaseolus mungo*	Black gram	Udad	January–December	Dhal, steamed, ground, fried as fritter
8	*Pisum sativum* (2 var.)	Peas (Green tender, dry)	vatana	December–April	Dhal, steamed, ground, fried as fritter
9	*Vigna catjung* (2 var.)	Cow pea (pods, dry)	chowli, chowli sing	January–December	Dhal, steamed, ground, fried as fritter
	Roots and tubers				
1	*Asparagus racemosus*	–	shatavari	June–September*	Boiled
2	*Amorphophallus campanulatus*	Yam or Elephant foot	suran	October–May	Boiled vegetable
3	*Chlorophytum borivilianum*	White musali bhaji	safed musali bhaji	June–September*	Boiled vegetable and roasted
4	*Colocasia antiquorum*	Colocasia	aloknala	June–September	Boiled vegetable
5	*Dioscorea esculenta*	Spinney yam	kankholi		–
6	*Ipomoea batatas*	Sweet potato	shakariya	October–May	Boiled, fried, grated
7	*Solanum tuberosum*	Potato	batata	January–December	Boiled, fried, grated
8	–	Red tuber	kand koychi	June–August	–
9	–	–	jungli kand	June–August	Soaked, boiled and eaten with salt

– No data.
* Seasonality of use rather than months harvested.

Principal objectives and scope

Research was designed to understand the existing problems of food insecurity and malnutrition and gender equality and women's empowerment with this population. Using community-based participatory research methods, this study documented the Bhil traditional food system. This knowledge can be used to develop food security, nutrition and health promotion programmes and promote development strategies that contribute to preserving the ecosystem diversity of the Bhils and support their livelihoods, and to reduce vulnerability.

Methodology

Documentation of the Bhil community food system and identification of the traditional food species were undertaken in 2001–2002. This formed part of an FAO study entitled *Documenting Traditional Food Systems of Indigenous Peoples: Process and Methods with International Case Studies*, which included five case studies in Asia (Kuhnlein, 2003).

Household food consumption and dietary assessment surveys of 187 Bhil households yielded information on traditional food patterns, seasonal dietary habits, and procurement of food and cost of food production.

Table 10.2 Nutrient composition of selected Bhil traditional foods *(per 100 g of edible portion)*

Food items	Moisture	Energy		Protein	Fat	CHO	Fiber (total)	Ash	Calcium	Iron	Copper	Zinc	Magnesium	Manganese	Phosphorus
	g	kcal	kJ	g	g	g	g	g	mg	mg	mg	mg	mg	mg	mg
Cereals and grains[1]															
Pearl millet (bajra)	12.4	361	1 511	11.6	5.0	67.5	1.2	2.3	42	8.0	1.06	0.02	137	1.15	296
Sorghum (jowar)	11.9	349	1 459	10.4	1.9	72.6	1.6	1.6	25	4.1	0.46	1.60	171	0.78	222
Vegetables[2]															
Doli mahuda seeds	9.8	559	2 337	9	44.4	30.9	3.4	2.5	64	7.3	0.50	1.30	88	0.6	153
Junglikhand, cooked	84	63	263	0.9	0.1	14.5	0.4	0.1	31	2.5	0.04	0.50	8	0.1	9
Junglikhand, raw	81	72	301	1.4	0.3	16	0.8	0.5	10	0.8	0.08	0.30	18	0.1	33
Mokha leaves	66.1	111	464	3.5	0.9	22.1	4.4	3	831	5.1	0.10	0.70	173	1.2	51
Mushroom, dry	22	272	1137	20.6	4.3	37.8	11	4.3	94	79.4	1.40	6.10	147	2.4	487
Terana leaves	89	34	142	1.8	0.8	4.8	1.7	1.9	230	0.9	0.10	0.30	48	2.0	55
Fruits[1]															
Indian gooseberry (amla)	81.8	58	242	0.5	0.1	13.7	3.4	0.5	–	–	–	–	–	–	–
Indian jujube (bore)	81.6	74	309	0.8	0.3	17	–	0.3	4	0.5	0.12	0.10	–	0.17	9

CHO Carbohydrate.
– No data.
1 Gopalan, G., Rama Sastri, B.V., Balasubramanian S.C. 2002.
2 Nutritive value from NIN analysis.

Dietary information gathered from in-depth interviews provided the primary data to direct research operations. In this regard, key informant interviews were a powerful research tool to supplement and complement the information collected.

Community food system data

To determine the foods normally consumed, data were collected through field visits and a rigorous food consumption survey adapted from standard tools (Kuhnlein and Pelto, 1997; Kuhnlein, 2000; Kuhnlein, 2003). Scientific names, common names, and food preparation were documented and are presented in Table 10.1. Nutrient values for all foods were calculated using the Indian Food Composition Tables (Gopalan, Rama Sastri and Balasubramanian, 2002).

Food samples that did not have documented food composition values in the Indian Food Composition Tables were analysed at the National Institute of Nutrition in Hyderabad, India. These data are presented in Table 10.2, along with nutrient information on key foods mentioned in this chapter.

Dietary assessment

The survey team – consisting of one nutritionist, two community partners, one sociologist and the CECCT director – visited each household to collect quantitative dietary intake for one day, estimated by 24-hour recalls using the weighed method (Reddy, 1997). For each meal, the recall data included the food item consumed, its ingredients, the quantity in grams of the raw and cooked weight, and the cooked weight in household measures. Data were entered into two Excel spreadsheets: one detailed the household food pattern and another detailed individual dietary intake. Diets were analysed for all foods, and the nutritive value of the diet was calculated for energy, protein and micronutrient content using the Indian Food Composition Tables (Gopalan, Rama Sastri and Balasubramanian, 2002).

Food frequency intake and related data – such as ownership of land, names and ages of individual members

of the household and whether the mother was pregnant or lactating – were collected using food frequency questionnaires and household interviews, respectively.

Analysis and findings

Traditional food list

Ninety-five foods generally consumed by the Bhils were identified and tabulated. Foods were classified into food groups, and the numbers of food per group are shown in Table 10.3.

The Bhils were noted to have a high consumption of protein-rich foods such as meat and poultry, with 14 types of meat and poultry consumed. This level of consumption of meat and poultry was because of ready availability of animals in the jungle. Thirteen types of legumes and seven different kinds of cereals were also widely consumed.

Not all foods had identified nutrient contents. The nutritive values of certain foods (missing data in food list) were not available from published sources, but were included as imputed values in analysis.

Table 10.3 Food group classification of Bhil traditional food list

Food category	*No. items*
Cereals	9
Fish and seafood	9
Fruits, nuts and seeds	18
Green leafy vegetables	13
Meat and poultry	14
Other vegetables	10
Legumes	13
Roots and tubers	9
Total	**95**

Table 10.4 Methods of obtaining Bhil traditional food

Method	*No. items*
Cultivated	29
Domesticated	3
Gathered	9
Gathered, cultivated	1
Wild, gathered	32
Wild, gathered, cultivated	7
Wild, hunted	14
Total	**95**

Methods of obtaining food

The Bhils cultivated their own vegetables and fruits in farms and home gardens. The main cultivated crops were rice and *ragi* (finger millet) and, depending on irrigation facilities, other cereals and legumes were grown. Apart from this, they grew a few fruit trees such as mango, custard apple, guava, *ramphal* (Bullock's heart) and jackfruit. Fruits were also collected from the jungle. Fruits were usually eaten in times of scarcity, depending on seasonal availability. During summer, they ate *amla* (Indian gooseberry), jackfruit, *ramphal*, banana and mango. Of these, mango, jackfruit, *ramphal* and banana were grown in home gardens (by those who had more than 4 acres of land). During the monsoon, they ate *jamboo* (blackberry), banana and bamboo shoots and in winter, they ate *bore* (Indian jujube), *amla*, custard apple, guava and banana. *Amla* was picked from the forest and the remaining fruits were grown in home gardens or farms. Papaya was cultivated throughout the year in home gardens. Important methods of obtaining food were cultivation, gathering from the forests and hunting (animals and birds from the forest and rats from the fields) (Table 10.4).

All cereals commonly consumed were cultivated. These included rice, wheat, maize, *ragi*, *jowar* (sorghum), *kharai* and *varai* (common millet). Overall, 26 foods were cultivated, while 32 grew wild and were gathered from the jungle. Eight kinds of fruits and all leafy vegetables were collected from the jungle. They were eaten in large quantities when they were easily available. However, fruits such as papaya and mango were also cultivated. Fourteen animals and birds were hunted, while only three (goat, cow and hen) were domesticated and consumed. Owing to the ease with which these animals were obtained and the relatively low cost, these

Table 10.5 Seasonality of Bhil traditional food

Season	*No items*
February–March (monsoon)	1
February–May	1
March–May	9
April–June	6
April–July	1
May–June	1
June–September	23
October–May	1
October–January	4
November–December	1
November–January	2
November–February	2
November–May	1
November–August	1
December	2
Throughout the year	20
Whenever possible	5
Total	81

were also eaten relatively frequently. Eight wild foods were also cultivated. These included fruit such as jackfruit and *bore*, and green leafy vegetables such as teakwood, drumstick and *matla* (prickly amaranth).

Fish was an integral part of the diet and most families consumed it frequently because it was easy to obtain. Fish was usually caught from rivers or ponds using fishing equipment made of bamboo (traditionally called *malli*, *katua* and *bothudi*).

Seasonality

Food seasonality was recorded (Table 10.5). Nineteen foods were consumed throughout the year, while 23 foods were consumed between June and September (during the period of monsoons). Most were fish, other seafood and green leafy vegetables. About 16 foods identified were consumed during summer. Most fruits, especially mango, were a favourite among families during summer. Meat and certain leaves such as Bengal gram (chick pea) leaves were eaten during summer. Seasonality of some items was not defined in the study period.

Table 10.6 Number of families in study grouped by land holding *(No. of acres)*

Group	*No. of acres*	*No. of families*			*Total*
		Summer	*Monsoon*	*Winter*	
1	0	14	7	10	31
	0.5	0	1	0	1
2	1	12	10	10	32
3	1.5	1	5	0	6
	2	16	9	0	25
4	2.5	1	4	0	5
	3	10	6	10	26
5	4	6	10	9	25
6	5	12	12	11	35
	10	0	1	0	1
Total		**72**	**65**	**50**	**187**

Table 10.7 Participants in study

Description of participants	*No. of participants*
Infants (1 to 3 years)	124
Pregnant women	40
Lactating women	96
Elderly persons	41
Total	**301**

Dietary intake – household and individual

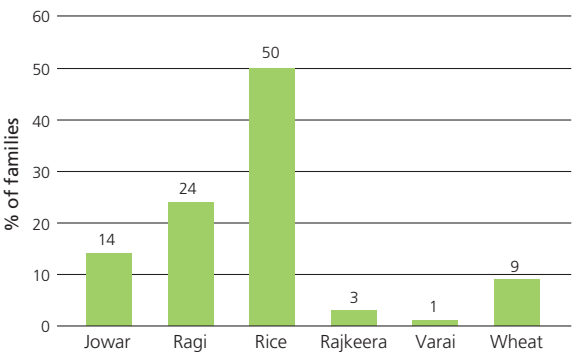
Table 10.6 illustrates the distribution of families and land holding per season. Families were classified into six categories in this analysis according to amount of land accessed, and 187 families were included. Food patterns of these families were recorded for three major seasons: summer, monsoon and winter. The study included 72 families for summer, 65 families for monsoon and 50 families for winter.

Table 10.7 shows the total number of children (one to three years of age), pregnant and lactating mothers and Elders participating in the study. Most breastfed children were zero to one year old, although children between one and two years were also breastfed in addition to receiving complementary foods.

Table 10.8 Consumption of cereals by land holding group *(No. of families)*

Group	No. of acres	Jowar rotla	Ragi roti	Rajkeera porridge	Rajkeera roti	Rice	Varai	Wheat roti
1	0	4	5	2	0	17	0	3
	0.5	0	1	0	0	0	0	0
2	1	5	11	0	0	12	0	4
3	1.5	1	2	0	0	3	0	0
	2	4	7	0	0	12	1	1
4	2.5	1	0	0	0	3	0	1
	3	4	5	0	0	13	1	3
5	4	2	4	1	0	16	0	2
6	5	5	8	2	1	17	0	2
	10	0	1	0	0	0	0	0
Total		26	44	5	1	93	2	16

Figure 10.3 Daily consumption of cereals by percentage of families



Cereals

Table 10.8 shows the consumption of cereals in the study group. The most commonly consumed type of cereal was rice (50 percent of the study group), of which 35 percent of families had 4 or more acres of land. However, 65 percent of families were in the lower income bracket (i.e. less than 4 acres of land). Due to the low cost and high availability of rice, it was consumed more often than other cereals among all groups. Rice was followed by *ragi* (24 percent), of which 70 percent of families had less than 3 acres of land. *Jowar* was consumed by 14 percent of families, of which 73 percent were in the lower income bracket. Wheat was consumed by 9 percent of families, of which 75 percent had less than 3 acres of land. *Ragi*, wheat and *jowar* were mainly consumed in the form of chapatti or roti. Figure 10.3 shows the consumption of cereals in 24-hour recalls by percentage in the study group. It was also noted that while the traditional *ragi* was consumed by some of the population, there was poor consumption by pregnant women, which was attributed to lack of awareness about its nutritive value and limited cultivation among households.

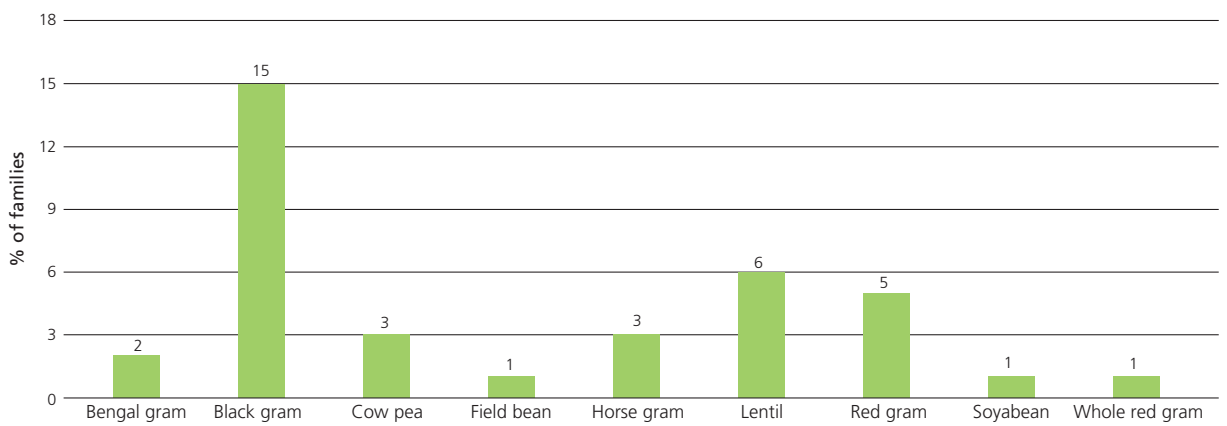
Legumes

Table 10.9 shows the pattern of consumption of legumes in the study group on a single day. These formed an important source of protein in the diet combined with other plant protein sources, predominantly cereals, roots and tubers. Black gram, the most common legume eaten, was consumed as dhal or gruel by 15 percent of families, of which 61 percent owned less than 3 acres of land. Black gram was followed by lentil, which was eaten by 6 percent of families, followed by red gram. There was no distinction in consumption of lentil by any land-holding group, although red gram was mainly eaten by the lower income group. Horse gram was another legume that was eaten by 3 percent of the study group. Figure 10.4 shows the consumption of legumes by percentage of families.

Table 10.9 Consumption of legumes by land-holding group *(No. of families)*

Group	No. of acres	Bengal gram flour porridge	Black gram	Black gram porridge	Black gram Bengal gram mix	Chowli	Horse gram	Horse gram porridge	Lentil	Red gram	Whole red gram
1	0	0	5	1	0	0	0	1	4	1	1
	0.5	0	1	0	0	0	0	0	0	0	0
2	1	1	0	5	0	1	1	1	0	2	1
3	1.5	0	0	0	0	0	0	0	0	0	0
	2	0	1	2	0	0	0	0	2	1	0
4	2.5	0	0	1	0	0	0	0	0	0	0
	3	1	1	0	0	0	0	1	0	3	0
5	4	0	3	1	0	0	0	0	3	1	0
6	5	1	4	2	1	0	0	2	3	2	0
	10	0	0	0	0	0	0	0	0	0	0
Total		3	15	12	1	1	1	5	12	10	2

Figure 10.4 Daily consumption of legumes by percentage of families



Meat and poultry

Only around 17 percent of the study group ate some form of meat or poultry on the day they were interviewed (Table 10.10 and Figure 10.5). Most animals were hunted and eaten occasionally, usually two to three times in a month – a good source of protein in the daily diet. Domesticated animals like goats and chickens were eaten more frequently (10 percent of families) because of availability. Pig (pork) was eaten by only three families in the study group, and rabbit was also a common food.

Fish and seafood

Fish was obtained from the river or sea. This was also an easily available source of food and it was the most common food item consumed in this food group (27 percent of families). Varieties of fish are available during the monsoon season or throughout the year. This was a major source of protein and calcium in the diet. Dried *bubla* (lizardfish, commonly referred to as Bombay duck) was the most common fish eaten (22 percent of families). This was usually cooked with potato and *brinjal* (eggplant) as curry and eaten with either rice or roti. Shark and *mandeli* were also eaten frequently

Table 10.10 Consumption of meat and poultry by land holding group *(No. of families)*

Group	No. of acres	Bullock/ Cow meat curry	Hen fowl curry	Ghorpad curry	Goat meat curry	Parrot meat curry	Rabbit meat curry	Rat meat curry	Wild pig meat curry
1	0	0	2	0	0	0	1	0	0
	0.5	0	0	0	0	0	0	0	0
2	1	0	1	0	1	0	0	0	2
3	1.5	1	0	0	0	0	0	0	0
	2	0	0	1	2	1	2	0	1
4	2.5	0	0	0	0	0	0	1	0
	3	0	1	0	0	0	1	0	0
5	4	0	2	1	3	0	0	0	0
6	5	0	1	0	3	0	1	0	0
	10	0	0	0	0	0	0	0	0
Total		1	7	2	9	1	5	1	3

(48 percent of the fish-eating families). Table 10.11 shows the consumption pattern of seafood.

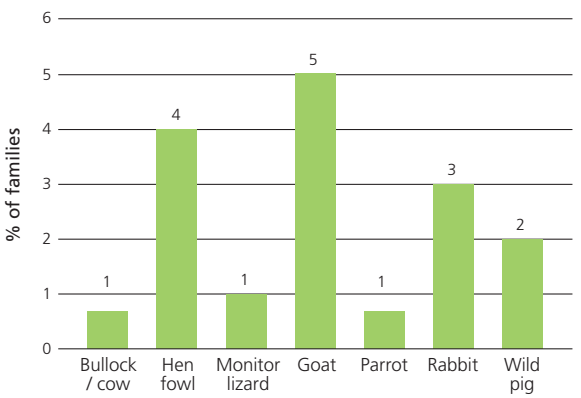
Green leafy vegetables and other vegetables

Most of the green leafy vegetables were gathered from the jungle. Only 5 percent of families ate leafy vegetables either by themselves or with rice flour. *Brinjal*, one of the most frequently eaten vegetables (9 percent of families), was usually eaten as part of a curry or dried. Fish with potato and *brinjal* was a common dish. Tomato was added mainly to dishes for flavour and taste. Both *brinjal* and tomato were commonly added because they were usually grown at home by the women and were available throughout the year. Other vegetables eaten were tender bamboo shoots, mushroom, lady's finger/okra and drumstick. Chili chutney and garlic chutney formed a significant part of the diet (Table 10.12).

Roots and tubers

It was found that roots and tubers were a good source of carbohydrate in the diet. The most common tuber was potato because of its low cost and high availability throughout the year. Approximately 11 percent of the study group included potato in their diet either as a vegetable or as part of a curry with fish and *brinjal*.

Figure 10.5 Daily consumption of meat and poultry by percentage of families



Other tubers, such as *aloknala* (colocasia), *kankholi* (spinney yam) and *kand koychi* were usually gathered from the wild. While *aloknala* was eaten throughout the year, *kankholi* and *kand koychi* were eaten during the monsoon and winter seasons. Table 10.13 describes the consumption by land holding.

Fruits

Wild fruits, found in the jungle, were eaten (particularly by men) in times of food scarcity. Several studies have shown a close relationship between the tribal ecosystem and nutritional status (Laxmaiah *et al.*, 2007).

Table 10.11 Consumption of seafood by land holding group *(No. of families)*

Group	No. of acres	Bodiya river fish curry	Bubla fish and potato curry	Bubla fish curry	Crab curry	Khari fish curry	Kokil fish and Kankholi veg.
1	0	0	3	1	1	1	0
	0.5	0	0	0	0	0	0
2	1	0	1	0	1	2	0
3	1.5	0	0	0	0	0	0
	2	1	0	0	0	0	0
4	2.5	0	1	0	0	0	0
	3	1	1	2	1	0	0
5	4	0	0	0	0	1	0
6	5	1	2	0	2	2	1
	10	0	0	0	0	0	0
Total		3	8	3	5	6	1

Table 10.12 Consumption of green leafy vegetables and other vegetables by land holding group *(No. of families)*

Group	No. of acres	Terani vegetable	Ugat phylli vegetable	Matla vegetable	Fenugreek leaves	Bamboo shoot curry	Bamboo vegetable	Brinjal and potato vegetable	Brinjal vegetable
1	0	0	0	0	0	0	0	1	0
	0.5	0	0	0	0	0	0	0	0
2	1	0	0	1	0	0	1	3	1
3	1.5	0	0	0	0	0	0	0	0
	2	1	1	2	0	2	0	1	0
4	2.5	0	0	0	1	0	0	0	0
	3	0	0	0	1	0	0	0	0
5	4	1	0	0	0	1	0	1	0
6	5	0	0	0	0	0	0	1	0
	10	0	0	0	0	0	0	0	0
Total		2	1	3	2	3	1	7	1

Generally, fruits are a favourite among the Bhils. In summer, mango and guava were the most frequently eaten fruits. In winter, *amla* and *bore* were commonly eaten. Papaya was noted as eaten throughout the year (Table 10.14).

Family dietary patterns

Family dietary patterns usually included eating a cereal such as wheat, *ragi*, *jowar rotla* (bread) and a lentil curry or *dhal*. Chili chutney was a daily accompaniment in the Bhil diet. Bhils with fewer resources would occasionally not eat at night or would have chapatti with chili or garlic chutney. Families with less than 3 acres of land consumed tea, prepared without milk, only one or twice in a week.

Relationship between micronutrient-rich foods and consumption pattern

The ten richest foods in total carotene content from the traditional food list were analysed. Figure 10.6

Kokil fish curry	*Kokil fish curry with with brinjal and potato*	*Mandeli fish and potato curry*	*Mandeli fish curry*	*Muru fish and vegetable curry*	*Muru fish curry*	*River fish and Muru fish curry*
0	0	0	1	0	0	0
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	0	0	0	1	0	0
0	0	1	0	0	0	0
0	0	0	0	0	0	0
0	1	0	2	0	1	0
1	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	0	0	0	0	0
1	**1**	**2**	**4**	**1**	**1**	**1**

Chowli vegetable	*Chili chutney*	*Field bean vegetable*	*Fish & pumpkin curry*	*Garlic chutney*	*Lady's finger vegetable*	*Mushroom curry*	*Soyabean vegetable*	*Chili garlic chutney*
0	25	1	0	3	0	0	0	0
0	0	0	0	1	0	0	0	0
1	27	0	0	4	0	0	1	0
0	4	0	1	1	0	0	0	0
0	23	0	0	2	0	0	0	0
0	4	0	0	1	0	0	0	0
1	24	0	0	0	0	1	1	1
1	24	1	0	0	0	0	0	0
1	32	0	0	2	1	0	0	0
1	1	0	0	0	0	0	0	0
5	**164**	**2**	**1**	**14**	**1**	**1**	**2**	**1**

shows the percentage of families in the study group consuming them. Tomato, papaya, cowpea and crab were the most frequently eaten among the carotene rich foods. Although drumstick and fenugreek leaves were high in carotene content, only 1 percent of the study group consumed them.

Among the iron-rich foods, lentils and *bubla* were each consumed by 6 percent of families, followed by *mandeli* fish, cowpea and crab, which were each consumed by 3 percent of families. Dried *karonda* was the vegetable with the highest iron content, but was not eaten by any families in the study group. Green leafy vegetables such as Bengal gram and *matla* were the next richest iron sources (Figure 10.7).

Among vitamin C-rich foods, tomato is relatively low. However, it was consumed by more families (6 percent) than the other foods in this category, making it an important source of the vitamin. *Amla*, which has the highest vitamin C content, was rarely consumed (2 percent) (Figure 10.8).

Table 10.13 Consumption of roots and tubers by land holding group *(No. of families)*

Group	No. of acres	Aloknala tuber	Kand koychi	Kankholi	Sweet potato curry	Potato and drumstick leaves
1	0	1	1	1	0	0
	0.5	0	0	0	0	0
2	1	0	0	0	0	1
3	1.5	1	0	0	0	0
	2	0	0	0	1	0
4	2.5	0	0	0	0	0
	3	1	0	0	0	1
5	4	0	0	0	1	0
6	5	0	0	0	0	0
	10	0	0	0	0	0
Total		3	1	1	2	2

Table 10.14 Consumption of fruits by land holding group *(No. of families)*

Group	No. of acres	Mango	Papaya	Guava	Mahua	Mahuda	Amla	Bore
1	0	0	0	0	1	0	2	0
	0.5	0	0	0	0	0	0	0
2	1	0	1	0	1	1	1	0
3	1.5	1	0	0	1	0	0	0
	2	3	0	1	0	0	0	0
4	2.5	0	1	0	0	0	0	0
	3	1	2	3	0	0	1	1
5	4	0	1	0	0	0	0	2
6	5	1	2	0	1	0	0	1
	10	0	0	0	0	0	0	0
Total		6	7	4	4	1	4	4

Figure 10.6 Relationship between carotene rich foods and daily Bhil consumption

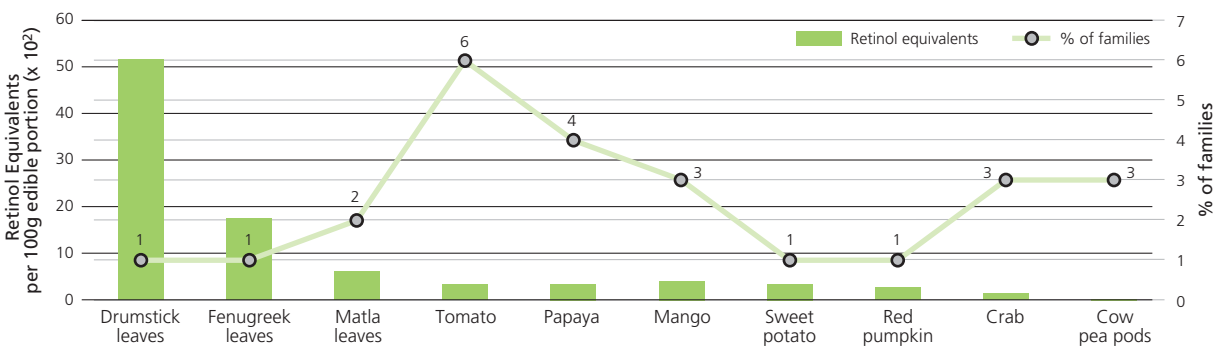


Figure 10.7 Relationship between iron rich foods and Bhil daily consumption

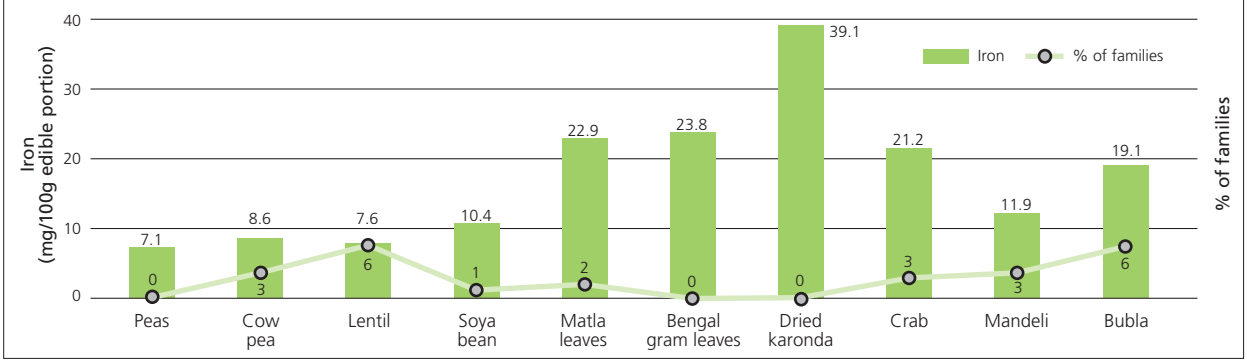
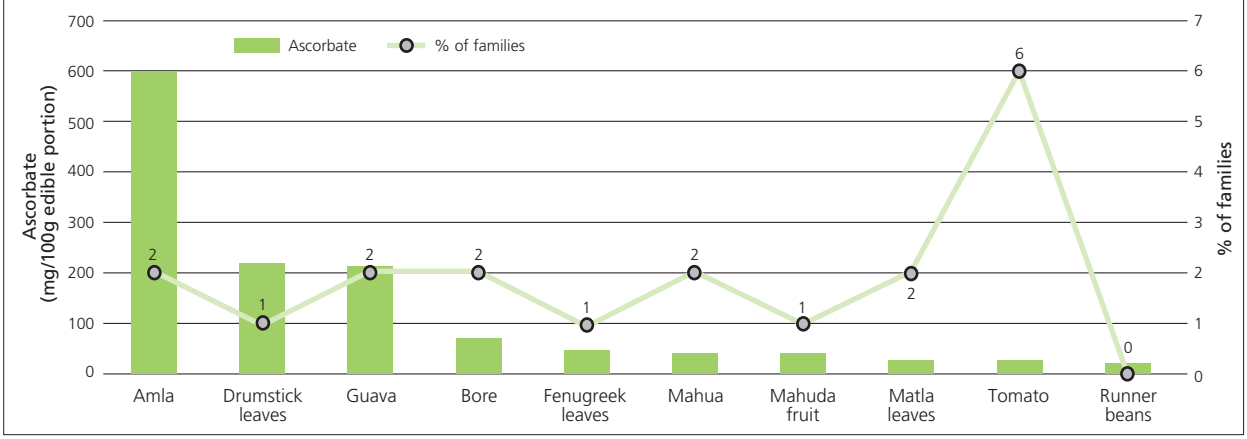


Figure 10.8 Relationship between vitamin C rich foods and Bhil daily consumption



Studies carried out by the National Nutrition Monitoring Bureau in different Indian states revealed that, even though there had been marked decrease in prevalence of severe undernutrition in the country in the last three decades, the prevalence of undernutrition remained high. The prevalence of undernutrition in tribal communities was relatively higher compared to the urban as well as rural counterparts (Krishnaswamy *et al.*, 1997).

Dietary habits of children

Frequency of food intake among children (one to three years)

The frequency of food intake in children was tabulated on a daily, weekly and seasonal basis. Data collected covered the three seasons: summer, monsoon and winter. Fifteen children were included in this analysis. Children between the ages of one and two years were breastfed once in the morning and also given complementary foods. Purchased milk was rarely given because of its high cost. However, those who domesticated goats or cows gave a diluted cup of milk to children if it was available. All children consumed the locally available biscuit almost every day. Children's foods highest in carotene content were *matla* leaves, papaya, crab, tomato, fenugreek leaves and drumstick leaves. Crab and drumstick leaves were eaten twice a week, while green leafy vegetables were eaten once or twice a week. Tomato was eaten more frequently because of its cultural acceptance and versatility in cooking. Tomato is used widely in lentil, curry and chutney preparations in India among both tribals and non-tribals. It is also

eaten raw by children and adults. Given its desirable sour and sweet taste and its ability to liquefy the dish, the tomato was a favourite in most meals and dishes.

Foods highest in iron content that were consumed by children were green leafy vegetables, such as Bengal gram or *chowli* leaves and *matla* leaves, and fish such as *bubla* and *mandeli*. These foods were eaten once or twice per week.

Dietary assessment of children (one to five years)

The diets of 40 children in the age group of one to five years were assessed. The children were grouped into two age categories: one to under three years (25 children) and three to five years (15 children). The average daily energy intakes of the diets were calculated. It was noted that the energy content of the diets was very low, amounting to only around 50 percent of the Indian Recommended Dietary Allowances (RDA) in the one to under year age group, while that of children in the three to five year age group provided a little over 50 percent of the Indian RDA for the age group. Table 10.15 presents the average intake of foods for children one to five years. Table 10.16 shows percent energy contribution of each of the food categories to their daily diet. Processed foods were sugar and rusk, a local salted biscuit that is a favourite among children, often eaten at breakfast or as a snack during mid-evening. Cultivated and wild indigenous foods provided a total of 68 percent of energy, whereas processed biscuits and other purchased foods contributed a total of 32 percent.

Dietary habits of pregnant and lactating mothers

Frequency of food intake among pregnant and lactating mothers

The frequency of food intake by pregnant and lactating mothers was tabulated on a daily, weekly and seasonal basis. Fifteen mothers were included, of which eight were lactating, six were pregnant and one was both pregnant and lactating. The intake of carotene rich foods, such as mango and fenugreek leaves, was generally one to three times per week. Iron-rich foods, such as *bubla* fish and *mandeli* fish, were eaten by three mothers one to two times per week. *Matla* leaves were eaten by ten mothers and consumed one to three times per week. Few vitamin C rich foods were consumed. Three mothers ate the only vitamin C rich fruit, *amla*, at least once a week.

Dietary intake analysis found that dietary energy and protein intakes of most pregnant women and pre-school children did not meet the Indian RDAs for many nutrients.

Table 10.15 Average intake of food in grams by Bhil children *(one to five years) (n = 40)*

Food group	Food category			
	Cultivated	Wild	Processed	Purchased
Cereals	40	–	–	127
Local biscuits	–	–	29	–
Legumes	10	–	–	28
Roots and tubers	135	100	–	–
Green leafy vegetables	30	92	–	–
Other vegetables	90	190	–	–
Fruits	100	92	–	–
Meat and poultry	–	77	–	–
Fish and seafood	–	–	–	32
Fats and oilseeds	–	–	–	8
Sugar	–	–	5	10

Table 10.16 Percent energy contribution of food categories to Bhil children's diet *(n = 40)*

Food group	Food category			
	Cultivated	Wild	Processed	Purchased
Cereals	18	–	–	18
Local biscuits	–	–	1	–
Legumes	3	–	–	4
Roots and tubers	6	6	–	–
Green leafy vegetables	6	7	–	–
Other vegetables	3	3	–	–
Fruits	2	3	–	–
Meat and poultry	–	11	–	–
Fish and seafood	–	–	–	3
Fats and oilseeds	–	–	–	3
Sugar	–	–	0.5	2.5
Total	**38**	**30**	**1.5**	**30.5**

Dietary assessment of pregnant women

Diets of 40 pregnant women in the age group of 19 to 40 years were assessed. A mean dietary energy intake of 1 501 kcal was noted. The major food group contributing to dietary energy was cereals, providing nearly 74 percent of the total dietary energy. This was followed by legumes, vegetables or meat, sugar and fat/oil, which contributed to the remaining 26 percent. It was observed that cultivated and purchased cereals like rice, wheat and *jowar* were consumed more commonly compared to *ragi*. Households included those that did not cultivate *ragi*. Tables 10.17 and 10.18 describe the average intake of foods and the energy contribution of food categories to the Bhil pregnant women's diets. Cultivated and purchased foods contributed over three-quarters of dietary energy, around a quarter of dietary energy was provided by indigenous/traditional foods and 2 percent of dietary energy was obtained from processed foods.

Several studies elsewhere in India have shown that iron deficiency anaemia continues to be widespread in all communities (NNMB, 2003). Apart from strengthening iron and folic acid distribution programmes, there is an urgent need to improve household consumption of protective foods, such as green leafy vegetables, fruits and small livestock and indigenous fish that are good sources of iron and other micronutrients.

Table 10.17 Average intake of food in grams by Bhil pregnant women *(n = 40)*

Food group	*Food category*			
	Cultivated	*Wild*	*Processed*	*Purchased*
Cereals	324	–	–	326
Local biscuits	–	–	26	–
Legumes	–	–	–	81
Roots and tubers	140	175	–	–
Green leafy vegetables	127	300	–	–
Other vegetables	200	100	–	–
Fruits	–	11	–	–
Meat and poultry	–	118	–	115
Fish and seafood	–	–	–	8
Fats and oilseeds	–	–	–	15

Anthropometric assessment

Women and children were found to have short statures and low body weights consistent with malnutrition as assessed by the National Centre for Health Statistics standards (Hamill *et al.*, 1977) and reflect data from Indian tribal populations recently reported (National Institute of Nutrition, 2000). Analysis of anthropometric data of 1 420 children, across all age groups, found that the prevalence of underweight status, assessed as moderate malnutrition was 45.8 percent, and the prevalence of underweight status assessed as severe malnutrition was 35.2 percent. Moderate malnutrition is defined as weight-for-age (WFA) <-2 SD from the median of the reference population and severe malnutrition is WFA <-3 SD from the median of the reference population. Only 16.1 percent of children had normal nutritional status. These findings were consistent with previous findings on tribes in Andhra Pradesh (NNMB, 2000).

Food preservation methods

The Bhils used traditional methods of food preservation or they consumed prepared foods within the same day or the following day for breakfast. Harvested foods were preserved for periods of drought or scarcity. Preservation methods included drying, roasting and

Table 10.18 Percent energy contribution of food categories to Bhil pregnant woman's diet *(n = 40)*

Food group	*Food category*			
	Cultivated	*Wild*	*Processed*	*Purchased*
Cereals	25	–	–	27
Local biscuits	–	–	1	–
Legumes	–	–	–	7
Roots and tubers	4	5	–	–
Green leafy vegetables	2	5	–	–
Other vegetables	3	2	–	–
Fruits	–	9	–	–
Meat and poultry	–	3	–	3
Fish and seafood	–	–	–	2
Fats and oilseeds	–	–	1	1
Total	**34.6**	**24.0**	**2.1**	**39.3**

the use of cow manure (Bhattacharjee *et al.*, 2006). Karsani niger seeds, rice, *varai* and legumes were preserved in bamboo baskets coated with cow manure. These containers were left in the sun to dry and then were filled with the seeds or grain. The manure helps to repel any insects from infesting the seeds or grain. A few families occasionally used neem leaves to preserve rice. Fire ash was also used as a preservative for legumes, such as black gram and red gram. Generally, no preservation method was used for *ragi* because the bitter red covering helps prevent insect infestation.

Drying was the most effective method of preservation among the Bhils. Excess catches of fish, such as *muru*, were first roasted over a hot plate or *tava* (flat iron pan used for roasting), and then dried and kept for consumption within a couple of days. Excess meat would be dried, by piercing it with sharp bamboo knives, and barbequing it over fire. Once it was well heated, it was stored by being wrapped in cloth and kept in bamboo baskets. When required, it would be taken out, cut into pieces and added to curries. Mushrooms were also dried and stored in baskets, which were normally used for catching crabs.

Ragi papads (dried thin pancakes) were made by making *ragi* batter, rolling it out into thin round shapes and leaving them in the sun to dry. They were then packed and marketed.

Processing of complementary foods

While carrying out the dietary assessment, the team conducted demonstrations on the preparation of complementary foods for infants and young children. Bhil women were encouraged to bring mixtures of cereals, legumes and nuts as available from their households. These mixtures were combined in proportions of 5:1:1 and were roasted, dried and finely ground by the traditional stone mill. This mixture could then be stored at room temperature for a period of up to two months in airtight containers.

This mixture was then combined with locally available cooked and mashed vegetables, or mashed fruit, and given as gruel to the infants and young children. Drawing upon such examples, mothers were advised to introduce complementary foods made from locally available ingredients to infants of six months of age and to continue breastfeeding up to two years of age – a practice that has been accepted by many Bhil women.

Conclusions

The key factors in this study were the Bhil people and their food system. The food-related behaviour of the Bhils played an important role in the food consumption and dietary practices. Food-related behaviour is complex and is determined by the interplay of many factors such as social, economic, cultural, traditional, environmental, etc. Understanding these factors, which affect nutritional status, becomes even more relevant when Bhil culture and traditions are threatened by modernization. It is, therefore, important to gain further insights into Bhil lifestyles, understand the way they live and uniquely utilize and manage their food and related resources. This can throw light on the potential elements that can be optimally utilized.

The results of the research presented here point to the need for strategic community-based interventions to improve food security, nutrition and health of the Bhils. There is a need to strengthen and promote food-based nutrition strategies and make use of the value of indigenous Bhil foods to diversify the diet. Specifically, nutrition education activities could be targeted towards pregnant women and young children who form the most vulnerable sections of the community. Further, dietary diversification, education and communication activities need to be strengthened and promoted for better health and nutrition of infants and children in Bhil communities. Bhil food diversity can be used productively for more sustainable and environmentally sound solutions to improving food security and nutrition ●

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