

Full Length Research Paper

The traditional food system of Kuloor watershed of Kumaon Himalaya, India

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The surrounding environment and biological diversity is an important aspect in the development of human civilization. The system of traditional knowledge has been developed in the society, and moved for further improvement in the society. The Central Himalayan region is rich in biological wealth and it may become an important resource for improvement of socio-economic status of the Himalayan people. The present study was designed to document the food recipes for sustainable livelihood in the Himalayan regions especially in the Kuloor watershed of Kumaon Himalaya. The Kuloor watershed is situated at Pithoragarh and Bageshwar district in Uttarakhand, India. It differs from plains in topography, elevation, geographic features, diversity of habitats for flora and fauna, ethnic diversity, land use system and socio-economic conditions. The low productivity of cereals, oilseeds and pulses is a major hindrance to the food security in the region. To meet the requirements of food for subsistence, local communities have identified a large number of plant species from the natural Forest stand. Local people are very skillful in identifying these wild plants, their palatability and preparation of recipes from them. Diversification of food recipes is a major specialty of this region. There are many recipes used as substitute of items which are meagerly produced in this Kuloor watershed area. The kuloor watershed area represents habitat and food habit with prevalent traditional local food system. The overall watershed is divided into three elevational zones viz. upper (2000 to 2361 m asl), middle (1000 to 2000 m asl) and lower (700 to 1000 m asl) zone. Each elevational zone comprises 5 villages for study. Sample households were randomly selected from 15 villages of the watershed. Information was collected from a house head (patron) about his diet on the basis of breakfast, lunch and dinner. After that, their food value was compared to national and international diet chart.

Key words: Kuloor, Traditional food, watershed, diet.

INTRODUCTION

Kuloor watershed is situated in Kumaon Himalayan region of Uttarakhand State, India. It differs from plains in topography, elevation, geographic features, diversity of habitats for flora and fauna, ethnic diversity, land use system and socio-economic conditions. The cultivation of several types of crops-cereals, millets, pulses, vegetables, oilseeds, spices and fruits yielding plants are the specific feature of this watershed. The low productivity of cereals, oilseeds and pulses is a major

hindrance to the food security in the region (Chopra and Pasi, 2002). Today food insecurity looms large in Kumaon Himalaya. In addition, physical, socio-economic, technological and administrative control also restricts the production in the hills (Tiwari, 1989). To meet the requirement for food for subsistence, local communities have identified a large number of plant species from the wild natural forest. In order to ensure their food security, local farming communities have encouraged the utilization of cultivated as well as wild plant species, available in the surrounding environment (Pant, 2002, Kazmi, 2003). Wild edible plants constitute a large portion of food consumed by local inhabitants in tribal

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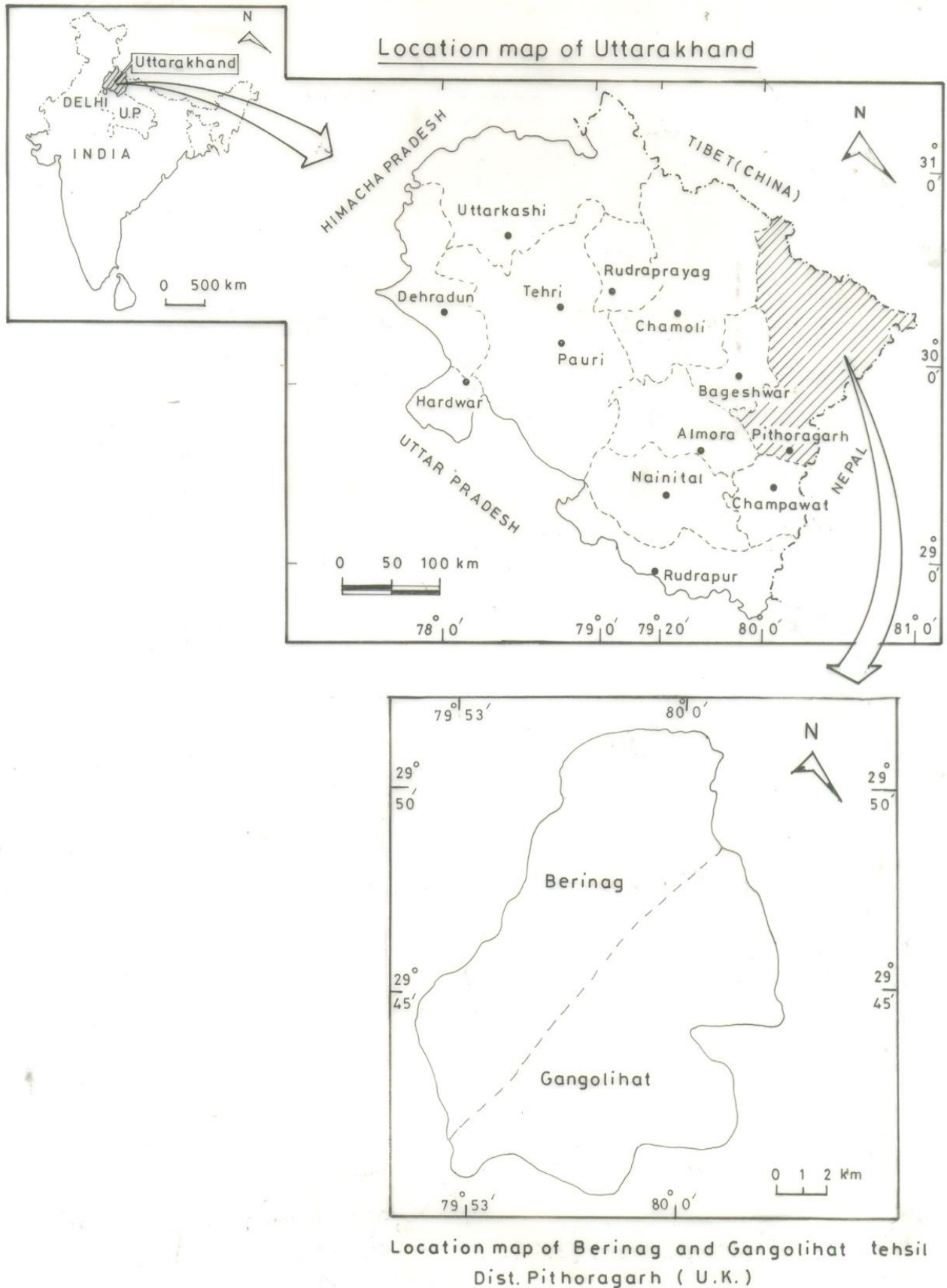


Figure 1. Location of Uttarakhand and Kuloor watershed in map of India.



Figure 1. Continued.

and hilly areas. Arora and Pandey (1996) gave a detailed account of wild edible plant species occurring in India. The Kumaon Himalaya represents a large number of wild edible plant species (Atkinson, 1882). Local people have wonderful skill to identify these wild plant species, their palatability and recipes preparation and product formation from them (Mehta et al., 2006, 2010).

Diversification of food recipes is a major specialty of the Kuloor watershed region (Bhatt, 2008). There are many recipes used as substitute of items which are meagerly produced in the region. The present study was designed

to document the food recipes for sustainable livelihood in the Himalayan regions especially in Kuloor watershed at Kumaon Himalaya (Figure 1).

Study area and climate

The study area Kuloor watershed is situated at Gangolihat and Berinag tehsil of Pithoragarh district and Kanda tehsil of Bageshwar district in Uttarakhand, India. It forms a representative in habited watershed with

prevalent traditional food system. The study area is located between 79°46' to 80°1' E longitude and 29°30' to 29°55'N latitude. The area covered by the watershed is 256 km². The physiography represents a typical mid-Himalayan watershed with an altitudinal range of 700 to 2361 m asl. The annual rainfall is 150 to 300 cm per annum. The watershed experiences three seasons, viz. summer (March to June), rainy (July to September) and winter (October to February). The highest temperature goes up to 40°C in Sheraghat valley and lowest below 0°C in upper reaches in Jhaltola village. The upper reaches experiences snowfall during the winters.

METHODOLOGY

Overall, the watershed is divided into three elevational zones, that is, upper elevational zone (2000 to 2361 m asl), middle elevational zone (1000 to 2000 m asl) and lower elevational zone (700 to 1000 m asl). Each elevational zone comprises of 5 villages for study. Sample households were randomly selected from 15 villages of the watershed, viz. Bayati, Sukna, Chakbora, Bansikhet, Dharichaura, Nayal, Pilkhi, Gwasikot, Simalta, Nargoli, Sheraghat, Sartola, Bans, Rawatsera and Kimtola from the aforementioned three elevational zones (5 from each zone). Data on traditional foods of Kuloor watershed of Kumaon Himalaya were collected from primary sources with the help of planned structured as well as unstructured questionnaire/interviews at individuals from household level during 2008 to 2010. Information obtained was authenticated from knowledgeable elderly people of the villages in the study area. The diet of per day divided into breakfast, lunch and dinner. Information was collected from a house head/patron about his diet on the basis of breakfast, lunch and dinner. After that, the goods values were taken from national and international diet chart (FAO, 1996), in addition of the total nutritional value of per day of per person. Average of the nutritional value of diet of the village level than each elevational zone level and overall watershed level were obtained. The data are summarized in the Tables 1 and 2.

RESULTS AND DISCUSSION

On the basis of the survey carried out in the whole Kuloor watershed in Kumaon Himalaya, the watershed was divided into three altitudinal zones for the study purpose. The detailed results at altitudinal level and overall watershed are as follows:

Food structure in upper altitudinal zone (2000 to 2361 m asl)

The upper altitudinal zone comes under upper altitudinal belt between 2000 and 2361 m asl. This belt comprises 5 villages for study that is Bayati, Sukna, Chakbora, Bansikhet and Dharichaura. The climate is pleasant and the traditional food is somewhat different from other altitudinal belts. The villagers eat breakfast, lunch and dinner per day in their daily diet routine. For breakfast, they use mostly tea, milk, paratha, roti and vegetables. For lunch, they use rice, pulses (gurunsh, lentil,

soyabean, urd) vegetables (pumpkin, torai, pinalu, radish) and sometimes roti. For dinner, they use mostly roti, poori, vegetables (potato, onion, tomato, gaderi, rye, spinach, mustard, gethi, tarur, gaba) meat, fish, eggs, chicken, milk, curd, ghee, whey, and butter. Other than this, they use fruits, nuts, wild fruits and some traditional foods like madirakabhat, konikikheer, bhatkibhatwani, gahatki dal, maduaki roti, gaderi ka saag and sometimes especial dishes on the occasion of traditional festivals and traditional worships in the temples. Mostly, the foods come from market and sometimes from household. The villagers work hard, so their diet level is high. Some of the villagers are malnourished especially scheduled caste because, they have few land for cultivation. The diet is the mixture of traditional and modern styles.

The average dietary food system of each person of per day is as follows: Moisture (403.96 g), protein (53.04 g), fat (13.73 g), fibre (8.74 g), carbohydrate (258.69 g), calcium (1.29 g), phosphorus (1.003 g), iron (51.02 mg), calorie (1354 kcal), carotene (1046 mg), thiamine (1.11 mg), niacin (10.00 mg), riboflavin (0.69 mg), and ascorbic acid (25.16 mg). The detailed food structure of the village is given in Table 3.

Food structure in middle altitudinal zone (1000 to 2000 m asl)

This zone comes under middle elevation between 1000 and 2000 m asl. This zone comprises of 5 villages for study purpose, these are: Nayal, Pilkhi, Gwasikot, Simalta and Nargoli. The climate is pleasant and the traditional food is almost same as the food of higher elevational zone. The villager of this zone uses breakfast, lunch and dinner per day in their daily diet like upper elevational zone. In breakfast, they mostly use tea, milk, paratha, roti and vegetables. Lunch comprises of rice, pulses (gurunsh, lentil, soyabean, urd), vegetables (pumpkin, torai, pinalu, radish) and sometimes roti. In dinner they use roti, poori, vegetables (potato, onion, tomato, gaderi, rye, spinach, mustard, gethi, tarur, gaba and bakla), meat, fish, eggs, chicken, milk, curd, ghee, whey and butter. Apart from these, their traditional food mostly resembles those of the upper elevational zone like madirakabhat, konikikheer, bhatkibhatwani, etc. Most of the food of villagers of the middle elevational zone also comes from the market and some are cultivated in their own lands. The lifestyle and food habit of peoples of this zone is similar to the upper elevational zone. People of these villages also work hard, thus they take heavy diet. The diet of middle altitudinal zone is mixed styled of both traditional and modern like upper altitudinal zone.

The average dietary food system of each person of per day is as follows: Moisture (392.22 g), protein (49.10 g), fat (14.39 g), fibre (8.01 g), carbohydrate (232.87 g), calcium (1.027 g), phosphorus (0.935 g), iron (40.77 mg), calorie (1246 kcal), carotene (984.7 mg), thiamine (1.066 mg), niacin (8.548 mg), riboflavin (0.657 mg), and

Table 1. Characteristics food features of the villages situated along an altitudinal gradient Kuloor watershed, Kumaun Himalaya.

Parameter	Lower altitude	Middle altitude	Higher altitude
Altitude	700 – 1000 m asl	1000 - 2000 m asl	2000 – 2361 m asl
Transhumance	Not practiced	Not practiced	Not practiced
Cropping patterns	3 crops per year	3 crops per year	3 crops per year
Distance from watershed	2 km	5 km	10 km
Distance from the road	1 km	2 km	5 km
Main occupation	Agriculture	Agriculture	Agriculture
Subsidiary occupation	Animal husbandry	Animal husbandry	Animal husbandry
Breakfast	Tea, milk, whey, roti ¹ , sabji ³ , parantha ¹¹	Tea, milk, whey, roti, sabji, parantha	Tea, milk, whey, roti, sabji, parantha
Lunch	Roti ¹ (wheat [*] , makka [#] , mandua [®]), chawal ² , sabji ³ , dal ⁴ (bhatt ¹ , Mansur [©] , urd ⁺ , gahat [®] , arhar [†]), karhi ⁵ , khichadi ⁶ (urd, Mansur), jaula ⁷ (mandira [‡]), ¹⁰ dubke ⁸ , bhatiya ⁹ , chhasiya ¹⁰ ,	Roti (wheat, makka, mandua), chawal, sabji, dal (bhatt, Mansur, urd, gahat, arhar), karhi, khichadi (urd, Mansur), jaula (mandira), dubke, bhatiya, chhasiya,	Roti (wheat, makka, mandua), chawal, sabji, dal (bhatt, Mansur, urd, gahat, arhar, gurunsh), karhi, khichadi (urd, Mansur), jaula (mandira), dubke, bhatiya, chhasiya,
Dinner	Roti, chawal, sabji, dal, poori, mutton, chicken, fish, eggs	Roti, chawal, sabji, dal, poori, mutton, chicken, fish, eggs	Roti, chawal, sabji, dal, poori, mutton, chicken, fish, eggs
Villages	Sartola, Seraghat, Bans, Rawatsera, Kimtola.	Nayal, Pilkhi, Gwasikot, Simalta, Nargoli	Bayati, Sukna, Chakbora, Bansikhet, Dharichaura

1. Bread; 2. Boiled rice; 3. Vegetables; 4. Boiled pulses; 5. Recipe of boiled whey; 6. Cooked rice with pulses; 7. Boiled rice in whey; 8. Cooked grinned pulses; 9. Cooked grinned *Glycine* spp. Fruits; 10. Boiled whey; 11. Stuffed bread. *. *Triticum* spp. #. *Zea mays* L. @. *Eleusine coracana* (L.) Gaertn!. *Glycine* spp. ©. *Lens esculenta* Medik.+ *Vigna mungo* (L.) Hepper ©. *Macrotyloma* spp. †. *Cajanus cajan* (L.) Huth ‡. *Echinochloa* spp.

ascorbic acid (19.16 mg). The detailed food structure of the village is given in Table 4.

Food structure in lower altitudinal zone (700 to 1000 m asl)

This area comes under lower altitudinal belt between the elevations of 700 and 1000 m asl. This zone also comprises 5 villages for study purposes, these are: Seraghat, Sartola, Bans,

Rawatsera and Kimtola. The climate is very hot in summer and cold in winter season. The traditional food is somewhat different from other altitudinal belt. The villagers of this zone also use breakfast, lunch and dinner per day in their daily diet. The breakfast of people of these villages is the same as upper and middle elevational zone; they mostly use tea, milk, paratha, roti and vegetables. Except these, fish is main ingredient of breakfast. For lunch, they use rice, pulses (gurunsh, lentil, soyabean, urd), and vegetables (pumpkin, torai,

pinalu, radish). In dinner, they use mostly roti, poori, vegetables (potato, onion, tomato, gaderi, rye, spinach, mustard, gethi, tarur and gaba), meat, fish, eggs, chicken, milk, curd, ghee, whey and butter. The villagers of this zone produce most part of their food in their farmlands, and sometimes their food comes from the market. The lifestyle of the villagers of this zone is slightly easier than the villagers of upper and middle zone due to availability of resources and fertile farmland.

Table 2. Traditional food of Kuloor watershed of Kumaon Himalaya.

S/N	Traditional food	Ingredients	Nutrients	Other characteristics
1	Fana ¹ /dubke	Deeping and grinding of bhat ¹ /gahat [®] and rice	Carbohydrate, protein, minerals	Helpful in jaundice
2	Churkwani ² /bhatwari	Frying and cooking of bhat ¹	Carbohydrate, protein, minerals	Rich sources of protein
3	Pulse of kulath/gahat [®]	Gahat [®]	Carbohydrate, protein, minerals	Helpful in stone
4	Roti of mandua/kode	Flour of mandua [®] (ragi)	Carbohydrate, protein, minerals	Lactation in female
5	Sattu ³	Maize [‡] ,barley [¥] . Wheat [*] , grametc. Frying and then grinding.	Carbohydrate, protein, minerals	Helpful in diabetes
6	Vegetable of lingura [†]	Lingura [†]	Vitamins, minerals	-
7	Roti of makka [#] /vegetable of mustard	Maize [‡] , mustard	Carbohydrate, vitamin, minerals	-
8	Mane/chhoe ⁴	Dipping and grinding of rice and urd ⁺ pulse.	Carbohydrate, protein	-
9	Bharwa ⁵ roti/beruwa	Grinding of pulses and mixed roti, then frying and cooking.	Carbohydrate, protein	-
10	Madira [‡] /jhangora/sanwa	Cooking with rice/ whey.	Carbohydrate, protein	-

1. A carbohydrate rich recipe; 2. Recipe of grinding *Glycine* spp.; 3. Powder of cereals; 4. Dish made by grinding of rice and pulses; 5. Stuffed bread by grinded pulses. *. *Triticum* spp. #. *Zea mays* L. @. *Eleusine coracana* (L.) Gaertn. !. *Glycine* spp. ©. *Lens esculenta* Medik. +. *Vigna mungo* (L.) Hepper ®. *Macrotyloma* spp. ‡. *Echinochloa* Spp †. *Diplazium* spp. ¥. *Hordeum vulgare* L.

Table 3. Local food system along upper altitudinal zone (2000 to 2361m asl).

No. of days	Eating time	Moisture (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrate (g)	Calcium (g)	Phosphorus (g)	Iron (mg)	Calorie (kcal)	Carotene (mg)	Thiamine (mg)	Niacin (mg)	Riboflavin (mg)	Ascorbic acid (mg)
Per day	Break fast	197.23	9.75	4.76	2.03	66.87	0.121	0.139	35.26	332	552	0.123	3.88	0.152	14.20
	Lunch	51.09	32.26	5.63	4.95	116.89	0.434	0.595	11.62	651	224.3	0.783	3.80	0.389	0.69
	Dinner	155.64	11.09	3.33	1.91	74.94	0.736	0.268	4.14	371	270.3	0.202	2.31	0.147	10.27
Per day	Total energy	403.96	53.10	13.72	8.99	258.7	1.291	1.002	51.02	1354	1046.6	1.108	10.99	0.688	25.16

The average dietary food system of each person of per day is as follows: Moisture (346.87 g), protein (55.22 g), fat (14.58 g), fibre (8.13 g), carbohydrate (211.45 g), calcium (0.790 g), phosphorus (0.948 g), iron (62.01 mg), calorie (1249.76 kcal), carotene (533.20 mg), thiamine (1.014 mg), niacin (7.70 mg), riboflavin (0.682 mg) and ascorbic acid (21.41 mg). The detailed food structure of the village is

Table 4. Local food system along middle altitudinal zone (1000 to 2000 m asl).

No. of days	Eating time	Moisture (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrate (g)	Calcium (g)	Phosphorus (g)	Iron (mg)	Calorie (kcal)	Carotene (mg)	Thiamine (mg)	Niacin (mg)	Riboflavin (mg)	Ascorbic acid (mg)
Per day	Break fast	179.96	7.22	3.96	6.94	51.51	0.26	0.108	24.62	258	31.12	0.0944	3.367	0.12	8.162
	Lunch	61.19	31.26	6.77	4.87	110.70	0.43	0.595	12.11	626	216.8	0.796	3.07	0.392	1.108
	Dinner	150.98	10.62	3.65	1.73	70.66	0.496	0.230	4.03	362	717.76	0.182	2.106	0.238	9.89
Per day	Total energy	392.22	49.10	14.39	8.01	232.87	1.027	0.935	40.77	1246	984.7	1.006	8.548	0.657	19.16

Table 5. Local food system along lower altitudinal zone (700 to 1000 m asl).

No. of days	Eating time	Moisture (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrate (g)	Calcium (g)	Phosphorus (g)	Iron (mg)	Calorie (kcal)	Carotene (mg)	Thiamine (mg)	Niacin (mg)	Riboflavin (mg)	Ascorbic acid (mg)
Per day	Break fast	185.41	8.16	4.71	2.18	50.39	0.102	0.117	43.21	256.68	31.48	0.094	2.39	0.15	6.15
	Lunch	61.55	31.45	5.28	4.46	117.49	0.413	0.577	10.66	638.24	240.36	0.749	3.03	0.384	0.744
	Dinner	139.94	15.21	3.99	1.49	63.57	0.275	0.253	8.132	354.84	261.36	0.170	2.27	0.148	14.51
Per day	Total energy	346.87	55.22	14.58	8.13	211.45	0.790	0.948	62.01	1249.76	533.20	1.014	7.70	0.682	21.41

given in Table 5.

Local food system of Kuloor watershed (700 to 2361 m asl)

The Kuloor watershed lies between the elevations of 700 and 2361 m asl. It comprises all 15 villages of the three altitudinal zones, which are surveyed for the study. These 15 villages are: Bayati, Sukna, Chakbora, Bansikhet, Dharichaura, Nayal, Pilkhi, Simalta, Nargoli, Seraghat, Sartola, Bans, Rawatsera and Kimtola. The climatic condition of Kuloor watershed varies according to changes in

altitudinal gradients. The food habit of Kuloor watershed is almost similar except from some villages of lower altitudinal zone. All villagers use breakfast, lunch and dinner per day in their daily diet routine. For breakfast, they mostly use tea, milk, paratha, roti and vegetables. For lunch, they use rice, pulses (gurunsh, lentil, soyabean, urd), vegetables (pumpkin, torai, pinalu, radish) and roti. For dinner, they mostly use roti, poori, vegetables (potato, onion, tomato, gaderi, rye, spinach, mustard, gethi, tarur, gaba and bakla), meat, fish, eggs, chicken, milk, curd, ghee, whey and butter. The traditional food of whole watershed is similar. The traditional foods are:

madirakabhat, konikikheer, bhatkibhatwani, gahatkidal, maduakiroti, gaderikasag, ganerakabhat etc. Apart from these they also use wild fruits, nuts and wild vegetables to fulfill their food requirements. Mostly the food comes from the market except some villages of lower altitudinal zones. All villagers of Kuloor watershed do hard work for earning of their livelihood, thus they take heavy diet.

The average dietary food system of each person of per day of Kuloor watershed is as(51.27 mg), calorie (1284 kcal), carotene (855 mg), thiamine (1.06 mg), niacin (8.75 mg), (0.676 mg), and ascorbic acid (21.91 mg). The detailed food

Table 6. Local food system of Kuloor watershed (700 to 2361 m asl).

No. of days	Eating time	Moisture (g)	Protein (g)	Fat (g)	Fibre (g)	Carbohydrate (g)	Calcium (g)	Phosphorus (g)	Iron (mg)	Calorie (kcal)	Carotene (mg)	Thiamine (mg)	Niacin (mg)	Riboflavin (mg)	Ascorbic acid (mg)
Per day	Break fast	187.53	8.36	4.48	3.72	56.26	0.161	0.121	34.36	282.23	204.87	0.104	3.21	0.141	9.50
	Lunch	57.94	31.66	5.89	4.76	115.03	0.435	0.589	11.46	638.41	227.15	0.774	3.30	0.388	0.847
	dinner	148.85	12.31	3.66	1.71	69.72	0.502	0.250	5.434	362.61	416.47	0.185	2.23	0.178	11.55
Per day	Total energy	381.02	52.45	14.23	8.29	234.33	1.03	0.961	51.27	1284	855	1.06	8.75	0.676	21.91

structure of the village is given in Table 6.

Conclusion

After conducting a broad survey of two years in the food system of Kuloor watershed of Kumaun Himalaya, we concluded that the food habit of whole watershed is similar except for some villages of lower elevational zone. The traditional food of whole watershed is similar, which is mostly prepared by millets, wild vegetables and wild fruits. They have excellent knowledge for identifying wild edible plants and making recipes from them. Thus, the main source of their food is forest stand and traditional farming. A large number of traditional recipes are mainly attributed to the cause of sustainability of livelihood of local inhabitants in Kuloor watershed of Kumaon Himalaya.

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