

Food Consumption Pattern and Nutritional Status of Marginal and Small Farm Families of U.S. Nagar District of Uttarakhand

Kusum Lata*, Kulshrestha Kalpana*, Pandey Anupama*

Abstract

With the increase in number of families, the food consumption pattern and nutritional status of 50 marginal and 50 small farm families in U.S. Nagar district of Uttarakhand state were assessed. The results indicated that the per capita availability of cereals per day on marginal and small farms were 402.82 and 413.52 grams respectively, which were lower than the recommended quantity of cereals per day (420 g). Similarly, availability and consumption level of pulses, vegetables and milk were also found to be quite low than the recommended quantities given by ICMR. Iron and carotene were the most deficient nutrients among the subjects of all the age groups in both marginal and small farm families. Thiamine, calcium and vitamin C intake was in safer zone in both types of families. The results of triceps skinfold thickness for females indicated 16.3 percent and 5.5 percent in marginal and small farm families respectively while figures with respect to males was 16.9 and 5.7 percent in marginal and small farms. The mid upper arm circumference (MUAC) results that 3.4 to 22 percent males and 4.8 to 22 percent females were at risk category (<5 percentile). The results of Gomez classification for children upto 5 years revealed that 71.43 and 45.45 percent children respectively on marginal and small farms suffered from various type of malnutrition. According to Water low classification, 65.22 percent and 39.02 percent children of 5-18 years on marginal and small farms were suffering from various degree of malnutrition. The overall results indicated that, from the point of view of food security and nutritional status, the subjects from both the small farm families as well as marginal families were unsecured.

Keywords: Food Security; Malnutrition; Per Capita Availability.

Introduction

Nutritional status is definitely influenced by the food and nutrition security of individuals. Food and nutrition security leading to a healthy population have been the endeavour of the Indian government. Attainment of food security is the biggest challenge for the country from the very beginning of new millennium. Food security refers to adequate availability of basic food items, particularly food grains, in the country as a whole and also availability of adequate purchasing power to meet the food requirements at the household level. According to the report of the International Food Policy Research

Institute (1992), Washington, food security is basically defined as access by all people, at all times, to the food needed for a healthy life. Accelerated agricultural development based on increase in productivity and income would meet both these elements of food security. The rapidly increasing population of our country, majority of which belongs to rural areas and the increasing demand for food makes large population to be absorbed as a labour force in agriculture. Due to increasing population, law of inheritance and partition of families, the number of marginal and small farmers is increasing. The low productivity in Indian agriculture is generally attributed to marginal (having cultivated land upto one hectare) and small size (possessing cultivated land from one to two hectare) of land holdings, which in turn causes low level of income and consequently affects the level of consumption and nutrition.

In view of the above facts, the present study was planned to study the food and nutrition security of small and marginal farm families in rural area of U.S. Nagar district in the state of Uttarakhand, so that

Author's Affiliation: College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar-263 145, U.S. Nagar, Uttarakhand.

Corresponding Author: Kulshrestha Kalpana, Professor & Head, Dept. of Foods & Nutrition, College of Home Science, G.B. Pant University of Agriculture and Technology, Pantnagar-263 145, U.S. Nagar, Uttarakhand
E-mail: kalpana238@gmail.com

essential steps can be formulated to improve upon the condition of such families.

Materials and Methods

Selection of the Study Area

The present study was conducted in six villages of Rudrapur block of Udham Singh Nagar district of Uttarakhand state. The selected villages were Shantipuri, Anandpur, Gangapur, Ganeshpur, Phulsunga and Narayanpur. A sample size of 100 farmers i.e. 50 marginal and 50 small was selected.

Required information related to family ecology, food habits and anthropometric measurements was collected.

Dietary Method

For measuring the dietary adequacy, the per capita availability of various food items was computed. 24 hours dietary recall method was used to collect information on food consumption of subjects of selected farm families. The selected farm families were asked about frequency of certain food items or food groups consumed during a specified time period i.e.

daily, twice a week, weekly, and monthly.

Anthropometric Measurements

The anthropometric measurements including height, weight triceps skinfold thickness and Mid Upper Arm Circumference (MUAC), were determined by the method given by Jelliff (1966).

Interpretation of Anthropometric Measurements

1. The interpretation of anthropometric measurements was done by Gomez classification for children between 0-5 years.
2. Waterlow classification for children between 5-18 years and BMI (Body Mass Index) classification for adults.

Results and Discussion

The results obtained on family type, farm income, food habits, educational status, food consumption pattern, dietary adequacy, average food intake and nutritional status of small and marginal families are being described here.

Table 1: General profile of selected marginal and small farmers

Sl. No.	Particulars	Marginal Farmers		Small farmers		Marginal + Small farmers	
		No.	%	No.	%	No.	%
1.	Family Type						
	Nuclear	27	54	24	48	51	51
	Joint	23	46	26	52	49	49
2.	Food habits						
	Vegetarian	28	56	19	38	47	47
	Non-vegetarian	22	44	31	62	53	53
3.	Educational status						
	Illiterate	22	10.18	36	11.15	64	10.70
	Primary	54	19.61	51	15.79	105	17.56
	Secondary	36	13.09	48	14.86	84	14.05
	High School	57	20.73	53	16.40	110	18.39
	Intermediate	41	14.91	57	17.65	98	16.39
	Graduation	34	12.36	48	14.86	82	13.71
	Above graduation	25	9.09	30	9.29	55	9.20

Family Type

General family profile (Table 1) showed that the percentage of nuclear families (51%) was higher than the joint families (49%) in the study area.

Farm Income

The average farm income of marginal and small farm families were Rs. 36192 and Rs. 58303 respectively, whereas annual per capita income on

small was Rs. 15563 and that for marginal farm it was Rs. 14383 as shown in Table 2 and Table 3.

Family Size

Average family size for marginal farm families (5.26) was smaller than that for the small farm families (6.65). Similarly the average size of land holdings for marginal farm families was lower (0.736 ha) than that of the small farm families (1.528 ha) as is clear from Table 2 and 3.

Table 2: Size of family and per capita income on marginal farms

Size of farms (ha.)	Average size of family (no.)	Farm Income (Rs.)	Non farm income (Rs.)	Total Income (Rs.)	Annual per capita income (Rs.)	Per capita/day income (Rs.)
0.40	4.88	21463 (40.41)	31650 (59.59)	53113 (100.00)	10884	29.82
0.60	5.40	34655 (47.05)	39000 (52.95)	73655 (100.00)	13640	37.37
0.80	4.75	42107 (45.56)	50310 (54.44)	92417 (100.00)	19663	53.87
1.00	6.00	46543 (58.13)	33530 (41.87)	80073 (100.00)	13346	36.56
overall (0.736)	5.26	36192 (48.38)	38623 (51.62)	74815 (100.00)	14383	39.41

Note: Figures in parenthesis show the percent contribution of farm and non farm income to total income respectively on different size and overall size of marginal farms.

Table 3: Size of family and per capita income on small farms

Size of farms (ha.)	Average size of family (no.)	Farm Income (Rs.)	Non farm income (Rs.)	Total Income (Rs.)	Annual per capita income (Rs.)	Per capita/day income (Rs.)
1.2	7.43	40830 (57.30)	30429 (42.70)	71259 (100.00)	9591	26.28
1.4	5.08	51976 (54.53)	43333 (45.47)	95309 (100.00)	18762	51.40
1.6	6.40	61967 (58.38)	44183 (41.62)	106150 (100.00)	16586	45.44
1.8	6.33	63657 (88.34)	8400 (11.66)	72057 (100.00)	11383	31.19
2.0	8.00	73085 (42.51)	98850 (57.49)	171935 (100.00)	21492	58.88
overall (1.528)	6.65	58303 (56.42)	45039 (43.58)	103342 (100.00)	15563	42.64

Note: Figures in parenthesis show the percent contribution of farm and non farm income to total income respectively on different size and overall size of small farms

Food Habits

On aggregate basis a higher percentage (53%) of families was found to be non-vegetarian in comparison to vegetarian families (47%). The percentage of non vegetarian families (62%) was higher on small farms as compared to marginal farms (44%) as depicted in Table-1.

marginal and small farms respectively. The literacy percentage on marginal and small farms were 89.82 and 88.85 percent respectively (Table 1). The percent of population having graduation and above graduation on marginal and small farms were 21.45 and 24.15 percent. In other words, the literacy percentage in the study area was higher than the all India average (64.84 percent).

Educational Status

Illiteracy was still prevailing on both the marginal and small farm families and about 10.18 and 11.15 percent subjects were found illiterate on both the

Food Consumption Pattern

The consumption frequency of various types of food materials like cereals, pulses, GLVS, roots and

Table 4: Consumption frequency of food among selected marginal and small farm families (percent)

Food	Family (N=50)	Daily (%)	Twice/ week (%)	Weekly	Frequently (%)	Monthly
Marginal Farm Families						
Cereals	50	100	-	-	-	-
Pulses	50	60	10	-	30	-
Green Leafy Vegetables	50	-	8	10	6	76
Roots and Tubers	50	100	-	-	-	-
Nuts and Oilseeds	50	100	-	-	-	-
Spices and Condiments	50	100	-	-	-	-
Meat, fish & poultry products	23	-	-	8	2	36
Milk and milk products	50	84	-	4	12	-
Small Farm Families						
Cereals	50	100	-	-	-	-
Pulses	50	75	5	-	20	-
Green Leafy Vegetables	50	2.0	12	4	8	74
Roots and Tubers	50	100	-	-	-	-
Nuts and Oilseeds	50	100	-	-	-	-
Spices and Condiments	50	100	-	-	-	-
Meat, fish & poultry products	32	-	4	6	4	50
Milk and milk products	50	74	6	-	20	-

tubers, nuts and oil seeds, spices and condiments, meat, fish and poultry products etc. by families of selected marginal and small farms have been given in Table 4.

It is evident from the results that cereals constituted the basic food materials and were consumed daily by both the categories of families. The pulses which are considered as the rich source of protein, were not available for daily consumption. Only 60 percent families of marginal and 75 percent of small farms were in a position to consume pulses daily. However 10 percent families on marginal and 5 percent on small farms were in a position to consume pulses only twice in a week.

The consumption of GLV was not found on marginal farms. Only 2 percent small farm families indicated the inclusion of green leafy vegetables in their daily diet. Results indicate that 8 percent families of marginal farms and 12 percent families of small farms consume GLVs twice in a week in their diet. Similarly weekly consumption of GLVs was observed by 10 and 4 percent families of marginal and small farms respectively. Six percent marginal and 8 percent small farm families told that they used to consume GLVs frequently and 76 and 74 percent marginal and small farm families respectively consumed GLVs once in a month.

The consumption of roots and tubers, nuts and oils, spices and condiments was made daily by all the families of both the categories.

Among the selected marginal and small farm families, the number of families consuming meat, fish and poultry products were 23 and 32 respectively. About 8, 2 and 36 percent families of marginal farm used to consume non vegetarian foods weekly, frequently and monthly respectively whereas by small families as weekly, frequently and monthly were 6, 4

and 50 percent respectively. The daily milk consumption was indicated by 84 and 74 percent of the marginal and small farm families respectively. However, 12% marginal and 20% small farm families consumed milk frequently.

The overall analysis of various types of food intake by marginal and small farm families indicated that except cereals, the consumption frequency of the other food materials was not to the desired level.

Per Capita Per Day Availability of Food Items

The results pertaining to per capita per day availability (g) of various food materials on various size of marginal and small farms are depicted in Tables 5 & 6. The per capita per day availability of various food items revealed that the availability of cereals on small (413.52 g) and marginal farms (402.82 g) was near to recommended quantities (420 g), but the availability of other three food items i.e. pulses, vegetables and milk were far below the requirements. The availability of pulses on marginal farms (27.06 g/day/capita) shows that it was even less than 50% of the recommended quantity (60 g/day/capita) and for small farms as 29.62 g/day/capita. The main reasons for low availability of pulses was that these were considered as more risky crops and hence farmers were not allocating area under pulse crops. Moreover, lands were also not suitable for successful cultivation of these crops and purchases were low due to their high costs.

Regarding the availability of vegetables by both marginal and small farm families, it was observed that the vegetables produced on the farm were not sufficient to meet the recommended requirements. The practice of growing vegetables was not common by the sample farmers and hence did not meet the recommended requirements. Due to lack of budget,

Table 5: Per capita per day availability (g) of important food materials on various size of marginal farms

Size of farms (ha.)	No. of farmers	Cereals	Pulses	Vegetables	Milk
0.40	8	398.75	25.13	64.38	106.88
0.60	12	396.58	26.17	77.50	128.33
0.80	18	403.78	27.06	82.08	128.33
1.0	12	410.33	29.25	88.02	139.00
overall (0.736) availability as percentage of recommended quantity	50	402.82	27.06	80.50	127.46
		95.91	45.10	20.13	42.49

Table 6: Per capita per day availability (g) of important food materials on various size of small farms

Size of farms (ha.)	No. of farmers	Cereals	Pulses	Vegetables	Milk
1.20	14	408.36	29.36	141.57	90.36
1.40	12	419.17	29.75	183.33	189.58
1.60	10	413.60	27.90	157.00	198.50
1.80	6	412.00	28.50	153.50	120.00
2.00	8	415.13	32.88	185.00	210.62
overall (1.528) availability as percentage of recommended quantity	50	413.52	29.62	163.06	158.60
		98.46	49.37	40.77	52.87

additional purchases of vegetables was not made on majority of sample farms. Milk consumption was better than pulses and vegetables availability due to large number of milch cattles reared by the people.

Dietary Adequacy

Nutrient adequacy for the subjects is given in Table

7. It was observed that the subjects of the both marginal and small farms were most deficient in iron and carotene i.e. 55.7% and 74.2% subjects of marginal families were found having adequacy <50% for iron and carotene respectively and in small farm 47.1% subjects had iron adequacy <50% and 69.3% had carotene adequacy <50%. Only calcium, thiamine and vitamin C were taken adequately by subjects of both

Table 7: Percent adequacy of various nutrients among marginal and small farm families

Nutrients (%)	Marginal farm family (n=275)				Small farm family (n=323)			
	< 50%	50-75	75-100	>100% RDA	<50%	50-75	75-100	>100% RDA
Energy	8.7	38.9	36.7	15.7	5.9	23.2	43.9	27.0
Protein	2.2	17.8	21.1	58.9	1.9	9.6	25.7	62.8
Calcium	4.7	9.8	17.1	68.4	1.9	4.6	7.7	85.8
Iron	55.7	32.0	8.7	3.6	47.1	38.7	7.4	6.8
Carotene	74.2	1.8	2.2	21.8	69.3	4.0	5.6	21.1
Thiamine	3.6	9.1	17.1	70.2	1.9	2.8	11.1	84.2
Riboflavin	13.5	37.5	23.2	25.8	3.7	18.0	24.1	54.2
Niacin	7.6	26.2	34.2	32.0	4.3	12.1	32.2	51.4
Vitamin C	3.3	6.5	7.6	82.6	2.5	2.8	3.1	91.4

Table 8: Average food intake by the subjects of marginal farm families (gram/capita/day)

Nutrients (%)	Marginal farm family (n=275)				Small farm family (n=323)			
	< 50%	50-75	75-100	>100% RDA	<50%	50-75	75-100	>100% RDA
Energy	8.7	38.9	36.7	15.7	5.9	23.2	43.9	27.0
Protein	2.2	17.8	21.1	58.9	1.9	9.6	25.7	62.8
Calcium	4.7	9.8	17.1	68.4	1.9	4.6	7.7	85.8
Iron	55.7	32.0	8.7	3.6	47.1	38.7	7.4	6.8
Carotene	74.2	1.8	2.2	21.8	69.3	4.0	5.6	21.1
Thiamine	3.6	9.1	17.1	70.2	1.9	2.8	11.1	84.2
Riboflavin	13.5	37.5	23.2	25.8	3.7	18.0	24.1	54.2
Niacin	7.6	26.2	34.2	32.0	4.3	12.1	32.2	51.4
Vitamin C	3.3	6.5	7.6	82.6	2.5	2.8	3.1	91.4

Table 9: Average food intake by the subjects of small farm families (gram/ capita/day)

Age (years) and sex	Cereals (g)	Pulses (g)	Vegetables (g)	Fruits (g)	Milk (ml)	Meat (g)	Fat and oil (g)	Sugar/ Jiggery (g)
1-3	64	15	55	8	325	-	5	12
4-6	79	18	65	11	323	-	7	13
7-9	103	26	70	19	315	-	9	12
10-12 (male)	240	27	75	12	236	-	18	20
10-12 (female)	235	25	85	14	226	-	17	18
13-15 (male)	281	29	75	17	215	-	19	21
13-15 (female)	253	28	82	15	189	-	17	17
16-18 (male)	291	30	80	15	165	-	22	21
16-18 (female)	276	32	45	16	137	-	18	24
18-60 (male)	412	30	100	17	75	-	24	21
18-60 (female)	405	28	85	15	80	-	19	22
> 60 (male)	400	27	75	17	80	-	15	17
> 60 (female)	392	25	70	12	40	-	13	15

type of families. However protein adequacy was experienced by 58.9 and 62.8 percent of subjects of marginal and small farm families respectively. Energy, riboflavin and niacin were marginally adequate for maximum number of subjects.

Average Food Intake by Marginal and Small Farm Families

Consumption of cereals by children of all age groups on both type of families, was less than the recommended quantity. However, the consumption

of cereals was higher than the recommended quantities for adults. The level of pulse and vegetable consumption for all subjects was quite lower than the recommended quantities. Milk consumption by children was higher as compared to adults. Consumption of fruits was very low among subjects of all age groups. Similarly, consumption of fats and sugar were also found to be lower than the recommended levels.

In a nut shell, except cereals, the consumption level of all other food materials was lower than the recommended quantities in both groups of families as shown in Table 8 and 9.

Nutritional Status

Nutritional Status of Adults (18 years and above) of Small & Marginal Families (according to BMI classification) It was found that in the total sample size of 93 males and 99 females in marginal farm families about 36.12 percent adults were suffering from malnutrition (CED I+CED II+ CED III), 21.67 percent subjects possessed low weight but were normal, 92.14 percent were found to be normal whereas 38.74 percent were falling in obese grade I and 11.76 percent in obese grade II (Table 10). Whereas in small farm families about 31.92 percent family members were suffering from malnutrition

Table 10: Nutritional status of adult males and females (18 years and above) of small and marginal farm families (according to BMI classification)

BMI	Small farm families					Marginal farm families				
	Male	(%)	Female	(%)	Affected aggregate %	Male	(%)	Fe-male	(%)	Affected aggregate %
<16	4	3.70	2	1.80	5.51	2	2.15	8	8.08	10.23
16-17	2	1.85	4	3.60	10.97	2	2.15	4	4.04	6.19
17-18.5	5	4.63	12	10.81	15.44	8	8.60	11	11.11	19.70
18.5-20	10	9.26	12	10.81	20.07	7	7.53	14	14.14	21.67
20-25	50	46.30	48	43.24	89.54	50	53.76	38	38.39	92.14
25-30	31	28.70	25	22.52	51.23	21	22.58	16	16.16	38.74
>30	6	5.56	8	7.21	12.76	3	3.23	8	8.08	11.76

(CED I+II+III). About 89.54 percent adults were having normal and 20.07 percent low weight but normal nutritional status. The problem of grade I obese (51.23 percent) was observed to be more acute as compared to grade II obese (12.76 percent) as shown in Table 10.

A comparison of nutritional status of adults of marginal and small farm families indicated that all types of malnutrition on marginal farms were in severe form as compared to small farm families. This may be attributed to availability of inadequate food materials on both male and females members of marginal farms.

Nutritional Status of Children (0-5 yrs) on Marginal and Small Farms (based on Gomez Classification)

In all, 14 children in marginal farm families and 22 on small farms, between 0-5 years of age were

studied for assessing their nutritional status. Out of these, only 28.57 percent children on marginal farms and 54.55 percent children on small farms were found normal and remaining percentage of children on both the categories of farms were suffering from different degrees of malnutrition (Table 11). The nutritional status of 21.43 percent children on marginal farms and 36.36 percent on small farms was moderate. On marginal farms, the nutritional status of about 42.86 percent children was observed to be mild while the percentage of such children was quite low (9.09 percent) on small farms. The case of severe deficient nutritional status was observed only in children of marginal farm families and not observed on small farms. It was found that overall nutritional status of children on small farms was comparatively better than the children of marginal farm families.

Table 11: Nutritional status of children (0-5 years) in small and marginal farm families (according to Gomez Classification)

Nutritional status	Small farm families		Marginal farm families	
	No. of children (n=22)	Percentage	No. of children (n=14)	Percentage
Normal	12	54.55	4	28.57
Moderate	8	36.36	3	21.43
Mild	2	9.09	6	42.86
Severe	-	-	1	7.14
Total	22	100.00	14	100.00

Nutritional Status of Children (5-18 yrs) on Marginal and Small Farms (based on Waterlow Classification)

The nutritional status of 69 children of marginal farms and 82 children of small farms in the age group

of 5-18 yrs was studied as shown in Table 12.

Based on Waterlow classification about 34.78 percent children on marginal farms and 69.98 percent children of small farm families in the age group 5-18

years were identified as normal from nutrition point of view. On the other hand, more percentage of children (13.41 percent) in small farms were suffering from severe nutritional deficiency as compared to children in marginal farms (5.80 percent) as depicted in Table 12.

A comparison of nutritional status of children of marginal and small farms indicated that the degree of malnutrition among children of marginal farms was more pronounced as compared to small farms. Thus children on small farms were relatively better fed compared to marginal farms.

Table 12: Nutritional status of children (5-18 years) in small and marginal farm families (according to Waterlow Classification)

Nutritional status	Small farm families		Marginal farm families	
	No. of children (n=82)	Percentage	No. of children (n=69)	Percentage
Normal	50	69.98	24	34.78
Stunted	5	6.10	20	28.99
Wasted	16	19.51	21	30.43
Stunted & wasted	11	13.41	4	5.80
Total	82	100.00	69	100.00

Triceps Skinfold Thickness (TSK)

The triceps skinfold thickness (TSK) measurement revealed that higher percentage of males and females (16.9 and 16.3 percent respectively), of marginal farm families were falling in the risk category (<5 percentile) as compared to only 5.7 percent males and 5.5 percent females on small farms which indicated that status of small farms was relatively satisfactory as compared to marginal farms.

recommended quantities. Results for nutritional status of marginal and small farm families revealed that the nutritional status of adults as well as children of small farm families was better than that of marginal farm families.

Mid Upper Arm Circumference (MUAC)

However, results for mid upper arm circumference measurement, revealed that 22 percent each of males and females of marginal farms were falling in the risk category i.e. <5 percentile. About 3.4 percent males and 4.8 percent females of small farm families were at risk of malnutrition which was quite lower as compared to males and females of marginal farms. Only 0.8 percent of females and no male was found in the range of >95 percentile.

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Summary and Conclusion

Overall results of the study revealed that the food consumption pattern of both types of farm families was not satisfactory except cereals. The consumption level of all other food categories was lower than the

