Nutritional Status of Farm Women in Hills of Uttarakhand

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ABSTRACT

Uttarakhand is one of the few states in India where an overwhelming number of women have always been a part of the active work force due to their total involvement with agriculture, forest protection, cattle care, and dairying. Present study is an attempt to know the food consumption and dietary intakes of farm women in hills of Uttarakhand. The study was carried out on 70 farm women of Bhagartola and Maniyagar (adopted and non adopted village) in Almora district of Uttarakhand. The 24-hour dietary recall survey revealed that consumption of pulses, green leafy vegetables, other vegetables and fruits was less than the recommended levels among hill farm women with more severity in non-adopted village. The average daily energy consumption per capita per day in adopted and non adopted village was 2054 and 1739 kcal respectively, which is 7.7 and 21.8 per cent less than Recommended Dietary Allowance (2225 kcal). Iron intake in the daily diet of women in adopted and non-adopted village was found to be 18 mg and 16 mg which is respectively 40 and 46.6 per cent less than recommended level (30 mg). Prevalence of Chronic Energy Deficiency (CED) was found to be higher among the farm women of non-adopted village than adopted one. Respondents of adopted village differed significantly from respondents of non-adopted village in the consumption of energy, protein, riboflavin, niacin and ascorbic acid. Education, energy consumption and protein consumption have significantly positive relationship with nutritional status of respondents whereas family size has significantly negative relationship with nutritional status.

***Key words**: Foods; Nutritional status; Farm women;*

Women are considered as the backbone of hill economy in Uttarakhand State. Agriculture depends mostly on women folks in hills. Unlike the plain areas, the women participate in all the agricultural operations and also trek longer hilly areas to fetch much needed fuel, fodder and water. This heavy work is bound to leave its impact on the health of the women and girls in hills of Uttarakhand. Health of women is directly related to the well being of the entire family. The literature indicates that rural women face higher risks of morbidity and mortality because of strenuous physical work (*Rawat, 1995*). Women with poor health and nutrition are more likely to give birth to unhealthy babies. With poor health they are also less likely to be able to provide food and adequate care to their children. While malnutrition is prevalent among all segments of the population, poor nutrition among women is much more as it begins at infancy and continues throughout their life. *Pant (2002)* in a study reported that overwhelming population of hill women were in grip of severe to moderate malnutrition. *Upadhyay et al (2011)* reported that nutritional status as well as nutritional knowledge of hill women is unsatisfactory and needs interventions. Concern over women's nutritional status is mostly confined to pregnant and lactating women. Their nutritional and health status prior to and after these stages receives little or no attention. Keeping the above facts in mind, the present study was planned with the objective to assess the nutritional status of farm women in hill region of Uttarakhand.

METHODOLOGY

Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS) is engaged in promoting off-season vegetable production in Uttarakhand. Bhagartola is one of the adopted villages of VPKAS under the Horticulture Mission for North East Himalayan States (HMNEH) project in Almora district of Uttarakhand. In this village

all the farm families have adopted improved practices of vegetable production in open and protected condition. In order to assess the effects of increased vegetable production through adoption of improved vegetable production technology on the nutritional status of farm women,an adopted village Bhagartola and non-adopted village Maniyagar were purposively selected. The data collection was done in two stages, one in summer season (April-June, 2011) and the second in winter season (November-February, 2012). This was done to mitigate the effects of seasonality because the vegetable production and consumption differs in different cropping seasons. The data were collected from 35 farm women of adopted village and 35 farm women of non-adopted village through a pre-structured interview schedule. The data pertaining to the daily intake of foodstuff along with quantity was collected using 24 hour recall method. The quantity of raw food was calculated using the following formula:

$$RFI = \frac{TRQ \times II}{TCQ}$$

Where

RFI= Raw amount of a food stuff consumed by the individual
TRQ= Total raw quantity of food stuff used in that preparation
II= Individual intake of the cooked amount of preparation
TCQ= Total cooked quantity of food prepared.

The average daily intake of foods by individual respondent was computed and compared with the suggested levels of intake (*ICMR, 1981*). The nutritive values for the quantity of raw foods consumed by the individual respondent were calculated by using food composition tables (*Gopalan et al. 1989*) and compared with the recommended Daily Allowances (RDA).

Anthropometric measurement of weight and height of farm women was recorded using standard method in order to work out the *Body Mass Index* (BMI). The respondents were categorized into different grades of nutritional status using BMI index (*James et al. 1988*).

$$BMI\ (Kg/m^2) = \frac{Weight\ (Kg)}{Height\ (m) \times Height\ (m)}$$

Collected data was analyzed with the help of statistical techniques viz, percentage, arithmetic mean, standard deviation and two samples't' test. Coefficient of correlation was computed by Karl Pearson's formula to determine the nature of relationship between independent variables and nutritional status of farm women.

RESULTS AND DISCUSSION

General profile of the respondents: Table 1 reveals that in both type of village majority of farm women were in the age group of 31-45 years. In adopted village 45.7 per cent and in non-adopted village 54.3 per cent respondents were educated up to primary level. The average family size also differed in two categories of villages, being 5.2 in adopted village and 6.3 in non-adopted village. In adopted and non-adopted village 71 per cent and 49 per cent respondents had nuclear families respectively. As in hills farmers have small and scattered land holding therefore for calculating different categories of land holding Mean (M) and Standard Deviation (SD) was worked out. Land holding size indicates that majority

Table 1: General profile of the respondents

Variables	Adopted Village	Non adopted Village
Age		
18-30	7 (20)	9 (25.7)
31-45	26 (74.3)	23 (65.7)
46-60	2 (5.7)	3 (8.6)
Education		
Illiterate	6 (17.2)	10 (28.6)
Primary	16 (45.7)	19 (54.3)
High school	5 (14.3)	5 (14.3)
Intermediate	5 (14.3)	1 (2.8)
Graduation	2 (5.7)	0
Post Graduation	1 (2.8)	0
Family Size		
1-4	11 (31.4)	7 (20)
5-7	24 (68.4)	20 (57.1)
>7	-	8 (22.9)
Average family size	5.2	6.3
Type of family		
Nuclear	25 (71.4)	17 (48.6)
Joint	10 (28.6)	18 (51.4)
Land Holding		
<0.1 ha	1 (2.8)	3 (8.6)
0.1-0.6 ha	27 (77.2)	31 (88.6)
>0.6 ha	7 (20)	1 (2.8)
Occupation		
Agriculture	27 (77.1)	14 (40)
Labour	3 (8.5)	6 (17.1)
Artisan	1 (2.9)	5 (14.3)
Service	3 (8.6)	-
Business	1 (2.9)	-
Other	-	10 (28.6)

Table 2: Average consumption of various food items (g/day) among hill farm women:

Food Items	Adopted Village		Non Adopted Village		RDI
	Summer	Winter	Summer	Winter	
Cereals and Millets (g)	398	339	367	285	350
Pulses (g)	47	30	30.8	16	60
Green leafy vegetables (g)	66	91	32.6	79	125
Other vegetables (g)	52	62	17	17	75
Roots and tubers (g)	199	101	149	91	75
Milk (g)	224	230	132	158	200
Friuts (g)	27.3	18	9	4	30
Fats and oils (g)	25	27	26	29	35
Sugar and Jaggery (g)	26	30	24	26	30

Table 3: Consumption of nutrients (per day) by farm women in hills

Nutrients	Average intake of nutrients (per day)				RDA	't'
	Adopted Village		Non-Adopted Village			value
	mean	SD	mean	SD		
Protein (g)	58	8.0	45	5.2	50	6.72**
Energy (kcal)	2054	274.1	1739	193.9	2225	5.51**
Calcium (mg)	682	202	523	150.4	400	0.0004
Iron (mg)	18	3.2	16	3.45	30	0.02
Thiamin (mg)	1.6	0.24	1.3	0.15	1.3	1.3
Riboflavin (mg)	1.1	0.16	0.8	0.13	1.3	7.3**
Niacin (mg)	14.5	2.02	12	1.6	15	3.7**
Ascorbic Acid (mg)	99	42.5	60	29.7	40	4.7**
β -carotene (µg)	3040	2286	2104	1356	2400	0.04

** = Significant at 0.01 level SD=Standard deviation

of the respondents in adopted (77.2 %) and non-adopted village (88.6 %) had land holding size ranging from 0.1 ha to 0.6 ha. In adopted village majority of households i.e., 77 per cent whereas in non-adopted village only 40 per cent households had agriculture as their major occupation.

Food and Nutrient Intake: The information pertaining to the food consumption pattern of the farm women in hills has been given in Table 2. The results suggest that intake of cereals and pulses was less than Recommended Dietary Intake (RDI) in both types of the villages (adopted and non-adopted) during both seasons. Consumption of all the food groups except fats and oils was found to be higher among the women of adopted village than non-adopted village in both the seasons. Milk consumption was more than RDI in adopted village. Consumption of green leafy vegetables and other vegetables was more during winter season due to seasonal availability but it was still lower than the RDI in both types of villages. It was also found that consumption of other vegetables, fruits and fats & oils was lower than suggested levels in both the category of villages during both the seasons.

In order to assess nutrient intake of farm women in hills, average of nutrient intake during both season was calculated.

Energy: The average energy consumption per capita per day in adopted and non-adopted village was 2054 kcal and 1739 kcal respectively which is 7.7 and 21.8 per cent less than recommended level (2225 kcal). Energy consumption by respondents in adopted village was significantly higher than in non-adopted village at 1 percent level (Table 3). *Pant (2002)* also reported the average energy intake by the rural women of the Central Himalaya below the standard requirement. Restriction in energy intake affects adversely the utilization of

Table 4: Percentage distribution of farm women in hills according to intake of nutrients.

Intake of Nutrients	Adopted Village		Non Adopted Village	
	<50 % of RDA	<50% of RDA	<50 % of RDA	<RDA but >50 % of RDA
Protein (g)	-	11.4	-	80
Energy (kcal)	-	77.1	-	100
Calcium (mg)	-	2.9	-	25.7
Iron (mg)	20	80	45.8	54.2
Thiamin (mg)	-	5.7	-	45.7
Riboflavin (mg)	-	77.1	2.8	97.2
Niacin (mg)	-	51.4	-	91.4
Ascorbic Acid (mg)	-	5.7	-	31.4
β -carotene (µg)	11.4	42.8	7	51.4

dietary protein. Table 4 shows that in adopted and non-adopted villages 77 and 100 per cents respondents were consuming energy less than required amount. *Dobhal et al. (2003)* also reported that average intake of energy was lower than RDA among women of Uttarkashi.

Protein: The average protein consumption by women in non-adopted village was less than recommended level. Protein consumption by respondents in adopted village was significantly higher than in non-adopted village at 1.0 per cent level (Table 3). According to NNMB report 2002 intake of protein, energy, vitamin A and riboflavin were less than the RDA in almost all States. Protein plays an important role in many bio-chemical, biophysical and physiological processes in the body. Eighty percent respondents of non-adopted village were consuming protein less than RDA (Table 4).

Calcium: Intake of calcium was found to be higher than Recommended Dietary Allowance (RDA) among the women of both groups of villages. *Dobhal et al. (2003)* also reported higher percentage of women consuming adequate calcium in their diet. It was found that the coarse grains i.e, ragi and barnyard millet which are rich in calcium content being the part of the diet contributes towards higher intake of calcium, ß-carotene and ascorbic acid.

Iron: Table 3 shows that average iron consumption by respondents in adopted and non-adopted village was 18 mg and 16 mg respectively which is 40 and 46.6 per cent less than recommended level (30 mg). In India nearly 70 per cent of women are estimated to be iron deficient. Iron deficiency can exist without anemia. Iron Deficiency Anemia (IDA) is very late manifestation of iron deficiency because iron deficiency is very well tolerated. Anemia does not develop till storage iron is exhausted (*Shah, 2004*). The main reasons for IDA have been determined to be inadequate intake of iron, low bioavailability (1-6 percent) of dietary iron from plant foods (*Rao et al., 1983*).

It is evident from Table 3 that consumption of riboflavin, niacin and β -carotene was significantly (at 1 % level) higher among the farm women of adopted village than non-adopted village. Riboflavin deficiency leads to diseases like angular stomatitis, glossitis, skin lesions and chilosis whereas niacin deficiency leads to disease pellagra in humans. Over 80 per cent of the diary supply of vitamin A in the Indian diets is derived from its precursors, β -carotene, a-carotene, g-carotene and b-cryptoxanthin which are present in many plant foods. Among these carotenoids, β -carotene has the highest vitamin A activity. The important deficiency states due to vitamin 'A' intake in diet are night blindness, xerosis conjunctiva, xerosis cornea, bitot's spots, keratomalacia and follicular hyperkeratosis.

Table 4 reveals that farm women of both the villages were consuming iron less than RDA with 20 and 45.8 per cent respondents not even meeting the 50 per cent of requirement of iron. Diet containing foods of plant origin

Table 5: Protein calorie adequacy (%) among farm women in hills.

Villages	P+C+	P+C-	P-C+	P-C-
Adopted Village	22.8	65.8	-	11.4
Non adopted Village	-	17.1	-	82.9

P+C+ = protein adequacy- calorie adequacy
P+C- = protein adequacy- calorie inadequacy
P-C+ = protein inadequacy-calorie adequacy
P-C- = protein inadequacy-calorie inadequacy

Table 6: Prevalence (%) of chronic Energy Deficiency (CED) among farm women by physiological status.

BMI grades	BMI Range	Adopted village		Non adopted village	
		No	%	No	%
CED III	Less than 16	2	6	8	23
CED II	From 16 to 17	3	8	5	14
CED I	From 17 to 18.5	8	23	9	26
Low-Normal	From 18.5 to 20	7	20	8	23
Normal	From 20 to25	13	37	5	14
Over weight & obesity	$\geq$ 25	2	6	0	-

(CED defined by James et al 1988)

particularly cereals and pulses and lower consumption of green leafy vegetables could be the possible reasons of low consumption of iron. The *NNMB (2006)* survey revealed that the intake of dietary iron is grossly inadequate in most of the States, meeting less than 50 per cent of RDA of males (28 mg) or females (30 mg).

Table 5 clearly illustrates that majority of respondents of adopted village (65.8%) were adequate in protein but inadequate in calorie and 11.4 per cent were inadequate in both protein and calorie. In non-adopted village 82.9 per cent respondents were inadequate in both protein and calorie. It is clear from table 5 that inadequacy of both nutrients was higher in respondents of non-adopted village. According to *Reddy and Rao (2000)* without correcting the existing calorie gap, the provision of protein concentrates will not prevent protein-calorie malnutrition.

Nutritional Status: Nutritional status of farm women was assessed using Body Mass Index (BMI). Body Mass Index (BMI) of the respondents was computed using height and weight values and subjects were classified into various categories of Chronic Energy Deficiency (*James et al., 1988*). The findings in Table 6 and figure 1 suggest that prevalence of Chronic Energy Deficiency was higher among farm women of non-adopted village with 63 percent against 37 percent among farm women of adopted village. Only 37 and 14 per cent farm women of adopted and non-adopted villages, respectively, were found to be normal. This prevalence was found directly related to the calorie intake of the women. The BMI has good correlation for fatness and it indicates the muscle and fat mass in the adult body. In chronic energy deficiency, body weight and lean body mass is reduced leading to reduced energy cost of physical activity. As CED impairs the work performance, the working potential of subjects is likely to be reduced. The BMI is widely used as a measure of fatness, or the nutritional status of a population in both developed and developing countries. *Gautam and Thakur (2009)* found the prevalence of CED is higher (45.9%) among the hilly population of Uttarakhand, compared to the plains of Madhya Pradesh (36.9%).

Table 7: Relationship between nutritional status (using BMI) and different independent variables.

Independent variables	Correlation coefficient 'r' value
Age	-0.078 NS
Education	0.344**
Family Size	-0.235*
Land holding	0.124 NS
Energy Consumption	0.54 8**
Protein Consumption	0.516**

** = Significant at 0.01 level, NS = Non Significant,
* = Significant at 0.05 level, d.f = 68,

Relationship between nutritional status and independent variables. Table 7 suggests that education, energy consumption and protein consumption had highly significant positive relationship with overall nutritional status of the farm women. The family size had negative relationship (at 5% level). Age and size of land holding had no relationship with the nutritional status of the farm women.

CONCLUSION

The mindset of looking at food security only in terms of energy security has now changed. It is important to ensure balanced diet adequate in micro and macro nutrients. The results of present study revealed inadequate dietary intake among women of both adopted and non-adopted villages. In adopted village due to the use of improved technology in agriculture, income of the farmers has increased. More over vegetable

production under protected condition has resulted in higher availability of vegetables in off-season also. Results also show that dietary intake and nutritional status of farm women of adopted village is better than their counterparts in non-adopted village but it is still less than recommended level. The negative effects of malnutrition among women are compounded by heavy work demands, poverty, child bearing and rearing and special nutritional needs of women, resulting in increased susceptibility to illness and consequently higher morbidity. Therefore, in addition to intervention efforts towards improving economic conditions of farm families through increased crops and vegetable productivity, there is a need to revitalize and strengthen the nutrition education component of government programmes like ICDS.

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