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Dietary Status of Farm Women with Different Work Status

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ABSTRACT The present study was directed towards determining the dietary status of women representing commercial and subsistence farming but with different work status. The study covered a total number of 141 farm women selected from a random population of 285 households located in 17 villages belonging to Bijawara mandal of Devanahalli Taluk in Bangalore rural district of Karnataka State in India. The selected women represented three different work status viz. employed women (EW), partially employed women (PEW) and unemployed women (UEW). Results of the study indicated that women engaged in farming related activities have a larger amount of time devoted to work leading to a high energy output than women who were unemployed. Thus the limiting factor on the neutral effect observed on the nutrition of the women in both employed and partially employed having earned an additional income to their families appears to be the net increase in the physical labour resulting in increased energy expenditure consequently increasing the energy requirement. Thus participation in the cash economy did not appear to have translated into improved nutrition for the women themselves.

INTRODUCTION

Women constitute almost half of the agricultural labour force and contribute more towards family income. There is evidence that women's employment has the potential to benefit household nutrition through increasing household income (Kumar, 1978). However some characteristics of women's employment may also have important implications for household nutrition. Among poor households the seasonality of employment may have both direct and indirect negative effects on household nutrition. The former may occur through the high energy demands of the peak work seasons for the women and the latter through the resultant fluctuations in intra households food availability (Lukmanji, 1992). Women particularly in the rural areas continue to bear the burden of their dual role as producers and reproducers. Women's work time and heavy work load are seen as crucial factors affecting both their own and their children's health and nutrition. Any system involving women in income generating activities to alleviate poverty of households may have to focus on the health and nutrition of women and children (Chatterjee, 1989; Lukmanji, 1992). It is emphasised that mothers increased time allocation for farming activities may reduce both the time spent in child care activities and household food preparations. Moreover it may also increase the overall work load of the women leading to increased energy expenditure.

Therefore in the present study an attempt has been made to determine the dietary status of women with different work status belonging to subsistence and commercial farming families.

Study Design

The study was carried out in 17 villages out of the 23 villages belonging to Bijawara Mandal of Devanahalli Taluk in Bangalore rural district in Karnataka. The villages were selected using a randomised sampling procedure based on the fact that these are adjacently situated and homogenous in Socio-economic and physical attributes. All the villages followed typical cropping pattern having both subsistence and commercial farming.

Selection of Subjects

A general survey was conducted to locate the families involved in either subsistence or the commercial farming with irrigation and without irrigation. Out of a total of 285 households selected at random representing different farming systems - a total number of 141 women were selected for this study based on the nature, type and duration of the work that these women were engaged in. Women who were actively engaged in agricultural labour either in their own farm

and/or wages working atleast for a period of 8 to 10 hours in a day were grouped as Employed Women (EW). Women who were engaged for about 4 hours a day in any of the agricultural related operations were classified as Partially Employed Women (PEW). The women who were not involved in any of the agricultural activities (own farm or wages) formed the control group defined here as Unemployed Women (UEW) for the purpose of comparison which constituted 55, 42 and 44 of employed, partially employed and unemployed women respectively.

Development of Tools

Dietary history of the selected women were collected using a preformed questionnaire. This consisted of recording socio-economic status, frequency of food use and 24 hour diet recall.

The food intake of all the 141 women was assessed by interviewing the women with the help of household measures relevant to Indian Cuisine models to construct the individual womens 24 hours food intake. Information on the type of preparation, actual ingredients used and the quantity consumed was recorded. The reference day for the recall method on the food intake was the day immediately before the visit. Raw amounts for the cooked food items were derived by standardizing the different menu items and preparatory methods.

Energy expended in different activities was computed using the data on time use recall of the selected women as per the FAO-WHO estimates (WHO, 1985) of energy required per minute for specified class of activities.

Anthropometric Measurements - The height (Cm) weight (kg), arm circumference (cm), triceps skinfold (mm), waist (cm) and hip (cm) measurements using the standard procedure (Jelliffe, 1966 and Encyclopedia, 1993) were recorded for all 141 women.

Data Computation and Statistical Analysis

The collected information was consolidated in terms of each subject and computed for the whole group using descriptive analysis. Food intake data was converted to raw amounts in terms of food groups and in turn was translated into energy and nutrients by calculations using Food Composition tables (Gopalan, 1993). The nutrient intake of the women was computed against Recommended Dietary Intake (RDI) for ensuring the appropriateness of intake derived based on the Recommended Dietary Allowances (RDA) (ICMR, 1987) for age, gender and activity. Energy expended was expressed interms of their work status. The collected data was subjected to appropriate statistical analysis.

RESULTS

General Information

The mean age of the women was found to be 25± years. Majority of the women belonged to joint families. The level of education obtained by women belonging to commercial farming was found to be higher. Also women representing commercial group appeared to have better housing conditions, better sanitary facilities and also possessed higher material wealth when compared to women selected from subsistence group.

Dietary Assessment

Food Intake: Cereals were the major item of food consumed. The major staple in the diet of all the mothers was found to be ragi (Eleusine Cora cana) which accorded for a significant portion of cereal consumption. The food intake of women was similar in all the working groups and also the findings indicated that their food intake was not affected by their work status. The diets of mothers belonging to different workstatus showed all the features of a traditional diet of low income groups seen in India (Gopalan et al., 1993). It was monotonous, mainly vegetarian in nature and consisted of very low amounts of protective foods.

Nutrient Intake: The mean energy and nutrient intake of the selected women is presented in table 1 and 2. As observed it was apparent that work status has no influence on the energy and nutrient intake of women - while the energy intake was adequate due to a higher consumption of cereals, the lower intake of protective foods such as vegetables, fruits, meat and eggs reflected a deficient intake of micro nutrients except for calcium.

The energy intake of women by Body mass index (BMI) classification vis-a-vis work status

Table 1: Mean (± SD) daily intake of macro nutrients of selected women classified by their work status

Dietary constitutents	*Work status*					
	Employed women		*Partially employed women*		*Unemployed women*	
	Actual intake	*RDI*	*Actual intake*	*RDI*	*Actual intake*	*RDI*
Energy (Kcal)	2495[b] ± 271	2285 ±(260)	2370[a] ± 260	2360 ± 275	2425[ab] ± 378	2300 ± (235)
Protein (g)	53[b] ± 7	46 ± 5	50[a] ± 8	47 ± 6	51[a] ± 10	47 ± 5
Carbohydrate(g)	508[b] ± 60	*	480[a] ± 51	–	488[a] ± 77	–
Total fat (g)	28[a] ± 8	–	28[a] ± 10	–	30[a] ± 11	–
n	55		42		44	

Any two means in rows carrying different superscripts a.b.c ..... differ significantly (P < 0.05)
* No recommended intake

Table 2: Mean (± SD) daily intake of micro nutrients of selected women classified by their work status

Dietary constitutents	*Work status*					
	Employed women		*Partially employed women*		*Unemployed women*	
	Actual intake	*RDI*	*Actual intake*	*RDI*	*Actual intake*	*RDI*
Calcium (mg)	1620[b] ± 335	400	1420[a] ± 295	400	1490[a] ± 397	400
Iron (mg)	20[b] ± 4	30	17[a] ± 3	30	18[a] ± 4	30
Retinol (ug)	379[a] ± 327	600	355[a] ± 338	600	520[b] ± 460	600
Thiamine (mg)	1.8[a] ± 0.4	1.1 ± 0.1	1.6[a] ± 0.4	1.2 ± 0.1	1.0[a] ± 0.4	1.2 ± 0.1
Riboflavin (mg)	1.0[a] ± 0.2	1.3 ± 0.1	0.9[a] ± 0.2	1.3 ± 0.1	1.0[a] ± 0.2	1.3 ± 0.1
Niacin (mg)	7.3[a] ± 1.6	15 ± 2.0	6.9[a] ± 1.8	15.6 ± 2.0	7.0[a] ± 2.7	15.2 ± 2.0
Ascorbic Acid	19.0[a] ± 13	40	18.0[a] ± 11	40	25.0[b] ± 15	40

Any two means in rows carrying different superscripts a.b.c ..... differ significantly (P < 0.05)

is presented in table 3. The data indicated that the increased energy intake was associated with higher BMI irrespective of the work status. The resting energy/kg of body weight appeared to decrease with increasing BMI.

Most of the micronutrients like iron, retinol and B. complex vitamins (Table 2) were being obtained through (pulse and milk) and source of

Table 3: Energy intake of women by body mass index vis-a-vis work status

Work status / *BMI classification*	*Resting Energy*		*Actual intake*	
	1	*2*	*3*	*4*
Employed Women				
< 15-18	27 ± 2	1100 ± 64	60 ± 8	2455 ± 242
> 18-25	25 ± 2	1175 ± 65	55 ± 5	2495 ± 280
> 25	22 ± 0.5	1420 ± 41	45 ± 6	2730 ± 280
n = 55				
Partially EmployedWomen				
< 15-18	28 ± 2	1085 ± 58	59 ± 7	2295 ± 226
> 18-25	25 ± 1	1240 ± 81	49 ± 6	2455 ± 270
> 25	–	–	–	–
n = 42				
Unemployed Women				
< 15-18	27 ± 2	1110 ± 49	57 ± 10	2340 ± 417
> 18-25	26 ± 2	1215 ± 58	63 ± 8	2525 ± 295
> 25	–	–		–
n = 44				

(1) Calories per kg/body weight (2) Calories per day

iron and vitamin A. (Green leafy vegetables, animal protein, dairy products), riboflavin (dairy products) and ascorbic acid (fruits and raw vegetables) were either limited or totally absent. Though dairy products provided only a small percentage of calcium, bulk of it being contributed by "ragi". Thus calcium intake was 3.5 to 4 times higher than the recommended dietary intake (RDI). With the daily diet consisting of mainly cereals-with small amounts of other foods like fruits, vegetables, milk and flesh foods it was clearly evident that this diet could not adequately provide sufficient intake of most of the micro nutrients.

(Wang et al., 1994). As indicated earlier the work status did not affect their body size.

BMI vis-a-vis WHR of the women by work status is given in table 6. Significant percentage of women having lower body or gluteal femoral obesity were within the normal or lower normal range of BMI irrespective of their work status. This is in conformity with the studies carried out among Asian adults which showed higher percentage of body fat with low or normal BMI (Wang et al., 1994).

Percentile classification of women by midupper arm circumference (MUAC) triceps skinfold (TSF) and mid upper arm muscle circumference (MUAMC) is presented in table 7. Comparison of these criteria with standards (Jelliffe, 1966) confirmed that varying percentage of women were exhibiting different degrees of malnutrition irrespective of their work status. Sixty six percent, 67 per cent and 57 per cent of women in employed, partially employed and unemployed group respectively had MUAC between 60 to 80 per cent of standard indicating a low protein status. Similarly MUAMC also indicated 55, 55 and 47 per cent of women in employed, partially employed and unemployed group respectively to be between < 60 to 80 percent of the standard confirming a low protein.

TSF thickness in 41 to 55 per cent of the women in the three work status groups were low indicating that lower energy reserves were present as fat. Therefore, the earlier observation which indicated lower body or gluteal femoral

Table 4: Mean ± SD anthropometric measurements and indices of women classified by their work status

Measurement/Indices	*Work status*		
	E.W.	*PEW*	*UEW*
Height (cms)	$152^a \pm 5.5$	$154.5^b \pm 5.7$	$154^b \pm 5.7$
Weight (kg)	$44^a \pm 7.4$	$44.7^a \pm 7.4$	$44.1^a \pm 4.9$
Body Mass Index (BMI)	$19.2^a \pm 2.9$	$18.7^a \pm 2.4$	$18.6^a \pm 1.9$
Mid upper arm circumference (cm)	$22.4^a \pm 2.2$	$22.5^a \pm 2.4$	$22.2^a \pm 2.4$
Mid upper arm muscle circumference (cm)	$19.2^a \pm 1.4$	$19.3^a \pm 1.6$	$18.9^a \pm 2.3$
Trices skinfold	$10.1^a \pm 4.4$	$10.3^a \pm 4.2$	$106^a \pm 3.0$
Circumference (mm)			
Waist (cm)	$65.1^a \pm 6.5$	$65.6^a \pm 6.4$	$65.0^a \pm 4.6$
Hip (cm)	$85.2^a \pm 7.7$	$86.6^a \pm 7.0$	$85.3^a \pm 5.3$
Waist/Hip	0.76^a	0.76^a	0.76^a
n	55	42	44

Any two means in rows carrying different superscripts a,b.. differ significantly ($P < 0.05$)

Somatic Status of the Women

Somatic status reflect that the body size is influenced by several factors most important being heredity, environment and diet. At the time of the survey most of them appeared to be on the "thinner side" of the body build. This could be attributed to the heavy work load due to their involvement in both agriculture and household activities.

Mean anthropometric and indices of the women by their work status is presented in table 4. The results showed that only height had shown significant difference between the group but other measurements or indices were similar in all the groups.

The BMI and waist for hip ratio (WHR) of women classified by their work status is given in table 5. Though the BMI was low, the mean waist for hip ratio was found to be > 0.71 indicating a lower segment or gluteal femoral obesity

Table 5: Percentitle classification of women by body mass index and waist/hip ratio based on their work status

Class	*Work Status*		
	Employed women	*Partially employed women*	*Unemployed women*
BMI			
0-16.0	2 (4)	5 (12)	3 (6)
> 16.0 - 17.0	9 (16)	5 (12)	8 (18)
> 17.0 - 18.5	16 (29)	12 (28)	13 (30)
> 18.5 - 20.0	15 (27)	10 (24)	7 (16)
> 20.0 - 25.0	9 (16)	10 (24)	13 (30)
> 25.0 - 30.0	4(8)		
		χ^2 12.47 NS	
WHR			
< 0.7	1 (2)	3 (7)	1 (2)
< 0.71 -0.8	45 (82)	35 (83)	37 (84)
> 0.8 - 0.9	9 (16)	4 (10)	6 (14)
N	55	42	44
		χ^2 = 3.04 NS	

Figures in paraenthesis indicate the percentage
NS = Non significant

Table 6: Body mass index vis-a-vis waist/hip ratio of the selected women by their work status

Work status &	*WHR*		
BMI range	*< 0.7*	*> 0.71 to 0.8*	*> 0.8*
Employed Women			
< 15 - 18.5	1 (2)	23 (42)	3 (5)
> 18.5 - 25	-	19 (35)	5 (9)
> 25-30	-	3 (5)	1 (2)
n = 55	χ^2 = 2.0483 NS		
Partially employed women			
<15 - 18.5	3 (7)	17 (41)	2 (5)
> 18.5 - 25	1 (2)	17 (41)	2 (5)
> 25.-30	0	0	0
n = 42	χ^2 = 0.9058 NS		
Unemployed women			
< 15-18.5	0	21 (48)	3 (7)
> 18.5 - 25	1 (2)	16 (36)	3 (7)
> 25-30	0	0	0
n = 44	χ^2 = 1.3229 NS		

Figures in paraenthesis indicate the percentage
NS = Non significant

obesity indicated by increased WHR also should be taken as an indicator of malnutrition as abdominal obesity is being viewed as an adaptation process due to stress imposed by early and /or long term malnutrition. Since the dietary intake was similar in mothers, irrespective of the work status which showed a deficient intake of the micro nutrients, it is probable that increased WHR may be a cumulative effect of long term malnutrition. Though the energy and protein intake of the mother in the three different work status groups were found to be adequate (Table 1). Somatic criteria indicated a lower protein and energy status. Perhaps, this can be related to an increase in energy expenditure due to the heavy workload of these women in agriculture and household activities.

The comparison of mean time allocation for different activities of the women by their work status is presented in table 8. Daily household chores occupied a major share of the total time spent by all women. However, unemployed women spent significantly more time in household activities (531 min) and the same trend was also observed regarding child care (150 min).

Time spent for rest and sleep by women was found to be significantly higher in unemployed category (820 min) Since the women were not gainfully employed either in their own farm or engaged in paid labour.

Farm activities occupied a major share of time distributed by women belonging to employed category. Women particularly engaged in cash crop cultivation were engaged in some type of farming activities almost through out the year. This significant differences in the allocation of

Table 7: Percentile classification of women by MUAC, TSF and MUAMC by their work status

Measurement/Indices	*Work status*		
classification	*EW*	*PEW*	*UEW*
Mid Upper Arm Circumference			
< 60	–	–	2 (5)
> 61-70	6 (11)	6 (14)	4 (9)
> 71-80	30 (55)	22 (53)	19 (43)
> 81-90	15 (27)	9 (21)	17 (21)
> 90 (std)	4 (7)	5 (12)	2 (4)
		χ^2 = 15.61 NS	
Triceps Skinfold			
< 60	30 (55)	23 (55)	18 (41)
> 61-70	17 (31)	5 (12)	10 (23)
> 71-80	4 (7)	2 (5)	6 (4)
> 81-90	-	6 (14)	4 (9)
> 90 (std)	4 (7)	6 (14)	6 (14)
		χ^2 = 9.42 NS	
Mid Upper Arm Muscle Circumference			
< 60	13 (24)	13 (31)	6 (13)
> 61-70	11 (20)	3 (7)	8 (18)
> 71-80	6 (11)	7 (17)	7 (16)
> 81-90	8 (14)	2 (5)	6 (14)
> 90 (std)	1 (31)	17 (40)	17 (39)
		χ^2 = 9.38 NS	

Figures in paraenthesis indicate the percentage
NS = Non significant

time (247 min) was observed among women in farming activities.

On the contrary majority of women classified as "partially working" were engaged in taking care of the milch animals spent significantly more time (146 min) when compared to other two categories.

Women classified as "working women" spent significantly more time in hired labour. Most of these women had less land for their own cultivation but engaged in outside labour, whereas women belonging to "employed" and "partially employed" categories had their own farming activities (agriculture and animal husbandry). Thus, women grouped under "employed women" had to spend significantly more time on agriculture related activities followed by partially employed women.

Since body size measurements indicated a low energy-protein status despite an adequate intake, energy expended in daily activities by these women were computed (WHO, 1985). The estimates of energy expenditure is presented in table 9. The energy expenditure by these women by their work status clearly indicated that energy expended to be more in case of employed than in other. The energy balance in employed women showed a deficit of 765 Kcal/day.

DISCUSSION

The actual diet of the women in all the groups on the daily basis were simple consisting mainly of cereals with employed women group registering significantly higher intake of milk and milk products. The major staple (cereal) in the diet was ragi similar to the earlier reported studies (NNMB 1991). Intake of all other foods-pulses, green leafy vegetables and other vegetables were low in all the groups. It is reported that inadequate income is probably a major limiting factor in obtaining a nutritionally adequate diet (Ajula et al., 1981; Choudhry and Rao, 1983; Devadas, 1986). However, in the present study increased income through gainful employment did not promote better food intake for the women. The characteristic dietary pattern of women was essentially that of high carbohydrate and low fat. Nutrient intake of these women reflected the food intake and did not appear to be influenced by their work status. Except for energy, protein, calcium and thiamine and all other nutrients fell short of RDI (ICMR, 1987).

Despite the fact that the energy and protein intake were adequate this did not reflect in the body size of these women. The data revealed that more than 40 per cent of the women

Table 8: Mean ± SD daily time spent for different household and agricultural activities by women belonging to different work status

Activity	*Work status*		
	E.W.	*PEW*	*UEW*
Food Preparation	104^a ± 55	149^a ± 52	164^a ± 51
Fetching water	31^a ± 26	45^a ± 36	36^a ± 30
Cleaning vessels	46^a ± 21	55^a ± 24	59^a ± 21
Washing clothes	51^a ± 23	64^a ± 23	55^a ± 19
Collecting Fuel	32^a ± 29	27^b ± 33	20^b ± 29
Total household activities	372^a ±111	$4[illegible]^b$ ±117	531^b ±109
Child care	73^a ± 51	118^b ± 69	150^c ± 87
Personal care	36^a ± 12	42^a ± 15	47^a ± 17
Recreation	53^b ± 56	89^a ±112	65^a ± 61
Rest and Sleep	547^a ±123	657^b ±149	820^b ±120
Farm activities (own)	247^b ±193	47^a ± 73	-
Labour	140^b ±210	3^a ± 18	7^a ± 32
Dairy	74^b ± 72	146^c ± 83	16^c ± 36
Total agricultural activities	462^c ±109	196^b ± 63	23^a ± 45
n	55	42	44

Any two means in rows carrying different superscripts a,b.. differ significantly ($P < 0.05$)

irrespective of the work status were in the lower normal range and on an average more than 50 percent were undernourished (BMI 16-18.5). It is a fact that women are employed particularly in outside labour like agriculture, the BMI levels are reported to decline (Garcia, 1993). Considering the levels of physical activity the data indicated a deficit of more than 700 Kcal per day in employed women . Hence the results were indicative of the fact that women partially employed in cash cropping and involved in animal husbandry were expending a greater proportion of energy leading to a negative energy balance. This appeared to have found expression in lower BMI among the women.

Considerable proportion of women were also having a low protein status and this was apparent by the greater proportion of women having low MUAC and MUAMC. Even when the energy intake is adequate the energy expenditure was high as in the case of employed women - protein will naturally be utilised as energy (ICMR, 1987). Also, the sources of protein, pulses and milk was limited. Hence a larger proportion of women were having low protein status attributable to increased energy expenditure. However, most of the women irrespective of their work status were showing an increased waist for hip ratio which is an indication of lower segment obesity. It is hypothesised that stress - physiological or environmental - results in increased cortisol levels which seems to favour the redistribution of fat to the abdomen (Anon, 1994). Hence, it is expected that these women could be in considerable "stress" imposed by low energy protein status and high level activity.

Therefore in summary the dietary of these women could be stated to be low characterised by nutritionally inadequate diet. The risk of nutrient deficiencies appear to be greater in protein, Vitamin A, riboflavin, ascorbic acid and iron. Women are involved in energy intensive activities in both commercial and subsistence farming. The results indicated that womens participation in the cash economy though brought incremental income may negate their own nutritional status. However the womens employment may benefit household nutrition to a certain extent.

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