

Dietary survey as indicator of nutritional status of rural women of Bihar

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In every community, mothers and children are among the groups that are vulnerable to disease, disability and death. In recent years, there has been a remarkable upsurge of interest in the health and nutritional problems of women in the country. One of the major factors determining nutritional status of any community is food consumption. The study was conducted on 60 rural women from Bihar from two villages of Pusa block, Samastipur. The study was conducted to assess nutritional status of the respondents. The major findings of the study were that cereals and roots and tubers form the main diet of the respondents. Adequacy of cereals (131.36%) and roots and tubers (115.0%) is more than the RDA for the respondents of Birauli Khurd whereas for the respondents of Morsand Bahadur for cereals it was 127.33 per cent and roots and tubers 75.3 per cent of the RDA. The adequacy of energy and carbohydrate intake of the women of Birauli Khurd was more than that of the Morsand Bahadur while adequacy of other nutrients like protein, visible fat and total fat of the women of Morsand Bahadur was more than that of Birauli Khurd.

Key Words : Nutritional assessment, Dietary method, 24-hour recall method, Rural women

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INTRODUCTION

Undernourished women tend to deliver low birth weight babies (Kramer, 1987) and to have pregnancy complications (Baird, 1947). It is known that both weight before and during pregnancy can have a direct bearing on the birth weight of the offspring (Simpson *et al.*, 1975). Women among less privileged communities in India are malnourished (Samuel and Rao, 1992) and their dietary energy intake is not adequate to compensate their heavy physical work load (Chatterjee and Lambert, 1990).

The nutritional and health status of women is important both for the quality of their lives and for the survival and healthy development of their children, yet relatively little attention has been given on this area;

further women should not be considered solely with respect to their reproductive roles as mothers, adequate nutrition is a human right for all and the nutritional benefits to women's social and economic capabilities need to be viewed as goals (UNICEF, 1997). In recent years renewed emphasis, through different governmental programmes (ICDS, RCH etc.), have been given to improve nutritional status of mother.

Nutritional status is usually associated with food intake which, in turn, is taken to be dependent on income and hence poverty. Food and nutrient intake is related to quantity and quality of food intake and nutrient absorption which in turn is related to assimilation. Absorption depends upon the state of health of an individual. Food consumption depends on habits, preferences, perception and knowledge of basic nutrition. Intake of carbohydrates, proteins, fats and other basic nutrients is guided by the above considerations. Intake of these nutrients depends

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on the consumption of balanced diets. Prolonged consumption of diets deficient in calories and vitamins result in steady decrease in food and nutrient intake. Decreased food and nutrient intake may be due to low standard of living. Food expenditure pattern of people is the best yardstick to measure their living standards.

Keeping the above facts in view, the present was carried out with the following objectives:

- To study profile characteristics of rural women.
- To assess nutritional status of the respondents through dietary intake.

METHODOLOGY

The study work was carried out in the state of Bihar. Out of 38 districts, one district namely Samastipur was randomly selected. One block from Samastipur district namely Pusa block was selected randomly. Two villages from Pusa block were randomly selected. The villages selected were Birauli Khurd and Morsand. Rural women in the reproductive age group formed the sample for study. Thirty (30) women from each village were selected randomly. Thus a total of sixty (60) rural women formed the sample for the study. Data on profile of the respondents and dietary assessment were collected using a structured interview schedule. Nutritional status of the respondents was assessed by mean food and nutrient intake.

Food and nutrient intake- diet survey :

Food intake:

Information on food intake pattern of the respondents was collected using 24 hour recall method with the help of standardized diet survey vessels.

From the volume of cooked food recorded, the weight of the raw food consumed by the individual was calculated as follows:

$$\text{Quantity of food consumed} = \frac{\text{Total quantity of raw food used (g)} \times \text{Volume of cooked food consumed by the individual (ml)}}{\text{Total volume of the cooked item (ml)}}$$

Nutrient intake :

Nutritive value of each food item was calculated per consumption unit (PCU) per day by using adult consumption unit (ACU) for various age groups. The per capita nutrient intake of the individual was calculated from standard food consumption tables (Gopalan *et al.*, 1999). Nutrient adequacy was calculated to measure the extent of nutrient security with regard to various nutrients. It

was calculated using the following formula:

$$\text{Nutrient adequacy} = \frac{\text{Actual nutrient intake}}{\text{Recommended dietary allowance}} \times 100$$

Data collected were tabulated and compared with available standards. Data was expressed in percentages of the standard values for different parameters. Statistical analysis was carried out to draw meaningful interpretations. Statistical parameters used were mean, percentage and standard deviation.

OBSERVATIONS AND ASSESSMENT

The profile characteristics of the respondents and their nutritional assessment were tabulated and statistically interpreted.

Profile characteristics of the respondents :

Age of the respondents :

Table 1 represents age of the respondents. It is evident from this table that majority of the respondents from village Birauli Khurd and Morsand Bahadura belonged upto 35 years of age *i.e.* 76.67 per cent and 70.0 per cent, respectively. 23.33 per cent and 30.0 per cent of the respondents from village Birauli Khurd and Morsand Bahadura, respectively were above 35 years of age.

It is clear from the Table 1 that the mean age of the respondents of village Birauli Khurd is 30.37 years along with a standard deviation of ± 7.01 whereas the mean age of the respondents of village Morsand Bahadura is 30.80 years along with a standard deviation of ± 7.53 . Also it can be observed that there is only a slight difference in the mean age of the respondents of both the villages.

Table 1 : Age of the respondents

Age	Age in years	
	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Upto 35 years	23 (76.67)	21 (70.0)
More than 35 years	7 (23.33)	9 (30.0)
Mean age	30.37	30.80
Standard deviation	± 7.01	± 7.53

Figures in parenthesis indicate per cent

Educational level :

Table 2 shows educational level of the respondents. The data of the table reveals that majority of the respondents were illiterate. Eighty per cent (80.0%) of

the respondents from Birauli Khurd and sixty per cent (60.0%) of the respondents from Morsand Bahadura were illiterate. 13.33 per cent of the respondents from Birauli Khurd and 33.33 per cent respondents from Morsand Bahadura had studied upto middle level of school.

Table 2 : Educational level

Educational level	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Illiterate	24 (80.0)	18 (60.0)
Middle School	4 (13.33)	10 (33.33)
High School	2 (6.67)	2 (6.67)

Figures in parenthesis indicate per cent

Only 6.67 per cent of the respondents from both the villages had attended high school. The data of the table depicts low literacy rate of the respondents. Several factors may be responsible for this low literacy rate. Some of the factors can be poor economic status, lack of awareness on importance of girl education, gender biasness etc. Also the literacy rate of village Morsand Bahadura is better than Birauli Khurd.

Caste :

Caste of the respondents was categorized as forward, backward, scheduled caste, scheduled tribe and others as can be seen in Table 3.

It is observed from the table that all the respondents (100%) from Birauli Khurd belonged to scheduled caste. All of them belonged to 'chammar' caste *i.e.* shoemaker community.

Majority of the respondents (93.33%) from Morsand Bahadura belonged to backward caste. They belonged to different castes like 'Barber', 'Goldsmith', 'Kurmi', 'Vaishya' and 'Potter' community. One respondent each (3.33%) belonged to scheduled caste and others (muslim).

Table 3 : Caste of the respondents

Caste	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Forward caste	0 (0.0)	0 (0.0)
Backward caste	0 (0.0)	28 (93.33)
Scheduled caste	30 (100.0)	1 (3.33)
Scheduled tribe	0 (0.0)	0 (0.0)
Others (Muslim)	0 (0.0)	1 (3.33)

Figures in parenthesis indicate per cent

It is clear from the data of the table that there exists a caste system in the village. One particular caste or community settles in one part of the village as against the

mixed community system of urban areas.

Marital status :

Table 4 represents marital status of the respondents. It is evident from the table that all the respondent from both the villages were married.

Table 4 : Marital status

Marital status	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Married	30 (100.0)	30 (100.0)
Unmarried	0 (0.0)	0 (0.0)

Figures in parenthesis indicate per cent

Age at marriage :

The data of Table 5 depicts the age of the respondents at the time of their marriage. It can be noted from the table that majority of the respondents from both the villages were less than 18 years of age at the time of their marriage. 86.67 per cent of the respondents from Birauli Khurd and 80.0 per cent of the respondents from Morsand Bahadura were less than 18 years of age at the time of marriage. Remaining percentage of the respondents *i.e.* 13.33 per cent and 20.0 per cent, respectively from Birauli Khurd and Morsand Bahadura got married after 18 years of age.

Table 5 : Age at marriage

Age at marriage	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Less than 18 years	26 (86.67)	24 (80.0)
More than 18 years	4 (13.33)	6 (20.0)

Figures in parenthesis indicate per cent

It can be inferred from the data of the table that girls in rural areas are still getting married off at a younger age as against the age specified by law *i.e.* 18 years. This has an impact on the health and nutritional status of rural women when they get on to motherhood.

Age at 1st child birth :

The data of this table represents age of the respondents at the time of 1st child birth. It can be seen from Table 6 that majority of the respondents had given birth to their 1st child at a very young age. 63.33 per cent of the respondents from Birauli Khurd and 50.0 per cent of the respondents from Morsand Bahadura became mother at less than 19 years of age.

While 36.67 per cent and 50 per cent of the

Table 6 : Age at 1st child birth

Age at 1 st child birth	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Less than 19 years	19 (63.33)	15 (50.0)
More than 19 years	11 (36.67)	15 (50.0)

Figures in parenthesis indicate per cent

respondents respectively from Birauli Khurd and Morsand Bahadura had given birth to their 1st child at above 19 years of age.

It can be said from the data of the above Table 6 that women are not only getting married at an early age but also becoming mother at an early age. This has an adverse effect on health and nutritional status of both the mother as well as their children.

Respondent's occupation :

Table 7 depicts occupation of the respondents. It can be inferred from the data of this table that majority of the respondents (66.67%) from Birauli Khurd were farm labourers while 30.0 per cent of the respondents were housewife. Only one respondent (3.33%) was in service. She was working as 'Sahayika' in Anganwadi Centre.

Table 7 : Respondent's occupation

Occupation	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Housewife	9 (30.0)	22 (73.33)
Farm women	0 (0.0)	5 (16.67)
Farm labourer	20 (66.67)	2 (6.67)
Business women	0 (0.0)	1 (3.33)
Service	1 (3.33)	0 (0.0)

Figures in parenthesis indicate per cent

Majority of the respondents (73.33%) from Morsand Bahadura were housewife. 16.67 per cent were farm women, 6.67 per cent were farm labourer and 3.33 per cent was business women.

Monthly income of respondent's family :

Table 8 shows monthly income of the respondent's family. It can be observed that majority of the respondent's family monthly income ranged between Rs. 3000 – Rs. 6000.

63.33 per cent of the respondents from Birauli Khurd and 56.67 per cent from Morsand Bahadura had a monthly income between Rs. 3000 – Rs. 6000. 20.0 per cent and 16.67 per cent of the respondents from Birauli Khurd had a monthly income of more than Rs. 6000 and upto

Table 8 : Monthly income of respondent's family

Monthly income (Rs.)	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Upto Rs. 3000	5 (16.67)	4 (13.33)
Rs. 3001- Rs. 6000	19 (63.33)	17 (56.67)
More than Rs. 6000	6 (20.0)	9 (30.0)

Figures in parenthesis indicate per cent

Rs. 3000, respectively.

30.0 per cent and 13.33 per cent of the respondents from Morsand Bahadura had a monthly income of more than Rs. 6000 and upto Rs. 3000, respectively.

The data of the table infers that most of the respondents had to meet their family expenditure from a meager income. It also means that their purchasing power will also be poor. This has an impact on their food consumption also and hence, on their health and nutritional status. This is an important parameter that affects health and nutritional status of people.

Size of family :

The following table depicts family size of the respondents. It can be observed from the data of this Table 9 that majority of the respondents (40.0%) from Birauli Khurd had a family size of 5-6 members followed by 36.67 per cent and 23.33 per cent of the respondents with a family size of more than 6 members and upto 4 members, respectively.

Table 9 : Size of family

No. of family members	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Upto 4	7 (23.33)	4 (13.33)
5-6	12 (40.0)	8 (26.67)
More than 6	11 (36.67)	18 (60.0)

Figures in parenthesis indicate per cent

Majority of the respondents (60.0%) from Morsand Bahadura had a family size of more than 6 members while 26.67 per cent and 13.33 per cent of the respondents had a family size of 5-6 members and upto 4 members, respectively.

Dietary assessment :

Food habit :

The following Table 10 shows food habit of the respondents. It is seen that majority of the respondents from both the villages are non-vegetarian. 83.33 per cent of the respondents from Birauli Khurd and 93.33 per cent

of the respondents from Morsand Bahadura were non-vegetarian. Only 16.67 per cent of the respondents from Birauli Khurd and 6.67 per cent from Morsand Bahadura were vegetarian.

Table 10 : Food habit

Food habit	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Vegetarian	5 (16.67)	2 (6.67)
Non- vegetarian	25 (83.33)	28 (93.33)

Figures in parenthesis indicate per cent

But the respondent's frequency of having fleshy foods is very less. The respondents in general can afford to have fleshy foods only once in a month or two and that too in very less quantity.

General meal pattern of the respondents :

In order to assess their dietary pattern, the respondents were surveyed regarding their food habits and meal pattern. It was found that the general meal pattern of the respondents of both the villages were almost similar.

The respondents had three times of meal, *i.e.* breakfast, lunch and dinner. They do not take any snacks, early morning or mid day meal. They cook food two times a day, *i.e.* in the morning and evening. The food cooked in the morning time is taken twice, *i.e.* as breakfast and as lunch. They usually cook chapatti and potato based vegetable curry in the morning and rice, dhal and again potato based curry in the evening or *vice versa*.

Milk consumption of the respondents is negligible. It is only taken in the form of tea or otherwise a black tea. They seldom consume fruits and if any, then only seasonal fruits. Green leafy vegetables and other vegetables are also consumed in very small quantity and that too not very frequently. They usually consume potato which is grown in the field where they work as farm labourer or as farmer. Fleshy food is also consumed seldom. They usually eat egg, fish or chicken. Carbohydrate foods in the form of cereals and potato form their staple diet.

Food intake of the respondents :

Dietary survey was carried out to assess nutritional status of the respondents. For this purpose, 24 hour recall method was used. The respondents recalled the food consumed by them the previous day and the information furnished by them was recorded. Quantity of food

consumed by an individual was calculated for each food ingredient and then mean was calculated based on the data of the entire respondents village wise, which has been presented in Fig. 1.

Fig. 1 represents food intake of the respondents in terms of food adequacy. Food adequacy was calculated to assess adequacy of intake in terms of RDA met by the respondents. Since the values of food intake may not give proper picture about adequacy of the food hence, food intake was expressed in per cent adequacy.

Birauli Khurd :

An overall perusal of the figure highlights that cereals and roots and tubers form the main diet of the respondents. Adequacy of cereals (131.36%) and roots and tubers (115.0%) is more than the RDA. It highlights the fact that cereals and roots and tubers in the form of potato form the main source of diet of the people.

Adequacy of pulses met is 59.47 per cent which is far less than the RDA. As it has been found out that the consumption of meat and meat products is also very low, hence, less consumption of pulses could not meet the protein requirements of the respondents.

Intake of vegetables and fruits is far less than the RDA. Adequacy of GLVs is 15.0 per cent while that of other vegetables is 37.15 per cent. The respondents do not give much importance to consumption of fruits as is evident from the above figure. They eat cheap seasonal fruits as and when available. Adequacy of fruit intake is only 13.50 per cent which is very dismal.

Adequacy of fleshy foods met is 34 per cent. The frequency of intake of meat and meat products is very less. The reason for it is high cost of these products and low monthly income of the respondents. Adequacy of milk and milk products met is 6.75 per cent. This quantity is met through tea intake and sometimes in the form of deserts.

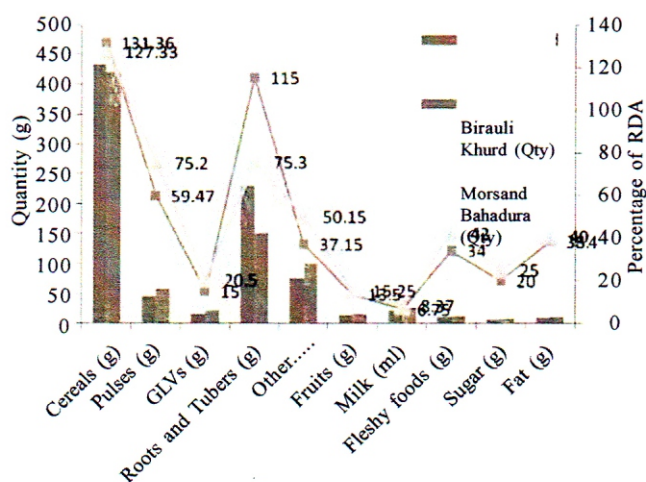
Adequacy of sugar intake is only 20 per cent of the RDA. This is usually taken through tea or deserts. Also it was found out that sugar consumption is not taken on a daily basis. Adequacy of fat intake is 38.4 per cent of the RDA which is marginal in quantity. This is usually met through visible oil in vegetable curries.

Morsand Bahadura :

An overall perusal of the figure highlights that cereals form the main diet of the respondents. Adequacy of cereals

(127.33%) is more than the RDA. It highlights the fact that cereals form the main source of diet of the people. They consume more cereals than required to satisfy hunger.

Adequacy of pulses met is 75.2 per cent which is marginally deficient than the RDA. As it has been found out that the consumption of meat and meat products is also very low, hence, less consumption of pulses could not meet the protein requirements of the respondents.



* A Manual - Dietary Guidelines for Indians, NIN, Hyderabad, 2011, 2nd Ed.

Fig. 1 : Mean food intake of the respondent

Intake of vegetables and fruits is far less than the RDA. Adequacy of roots and tubers is 75.3 per cent which is also marginally deficient than the RDA. Adequacy of GLVs is 20.5 per cent while that of other vegetables is 50.15 per cent. The respondents add green vegetables to potato which is more in quantity than green vegetables. Hence, intake of vegetables is only half of the RDA. The respondents do not give much importance to consumption of fruits as is evident from the above Fig. 1 of. They eat cheap seasonal fruits as and when available. Adequacy of fruit intake is only 15.25 per cent which is very low.

Adequacy of fleshy foods met is 42 per cent. The frequency of intake of meat and meat products is very less. The reason for it is high cost of these products and low monthly income of the respondents. Adequacy of milk and milk products met is 8.37 per cent. This quantity is met through tea intake and sometimes in the form of deserts.

Adequacy of sugar intake is only 25 per cent of RDA. It is just one-fourth of the RDA. This is usually taken through tea or deserts. Also it was found out that sugar consumption is not taken on a daily basis. Adequacy of fat intake is 40.8 per cent of RDA which is marginal in quantity. This is usually met through visible oil in vegetable curries.

Comparing the food intake of the respondents of both the villages, it can be observed that the adequacy of food intake (for all the food groups except roots and tubers) of the respondents of Morsand Bahadura is slightly better than the respondents of Birauli Khurd. This may be correlated with the higher monthly income of the respondents of Morsand Bahadura as compared with that of Birauli Khurd.

Mean nutrient intake of respondents :

Nutrient intake of the respondents was expressed as nutrient adequacy. Nutrient adequacy was calculated to measure the extent of nutrient security with regard to various nutrients.

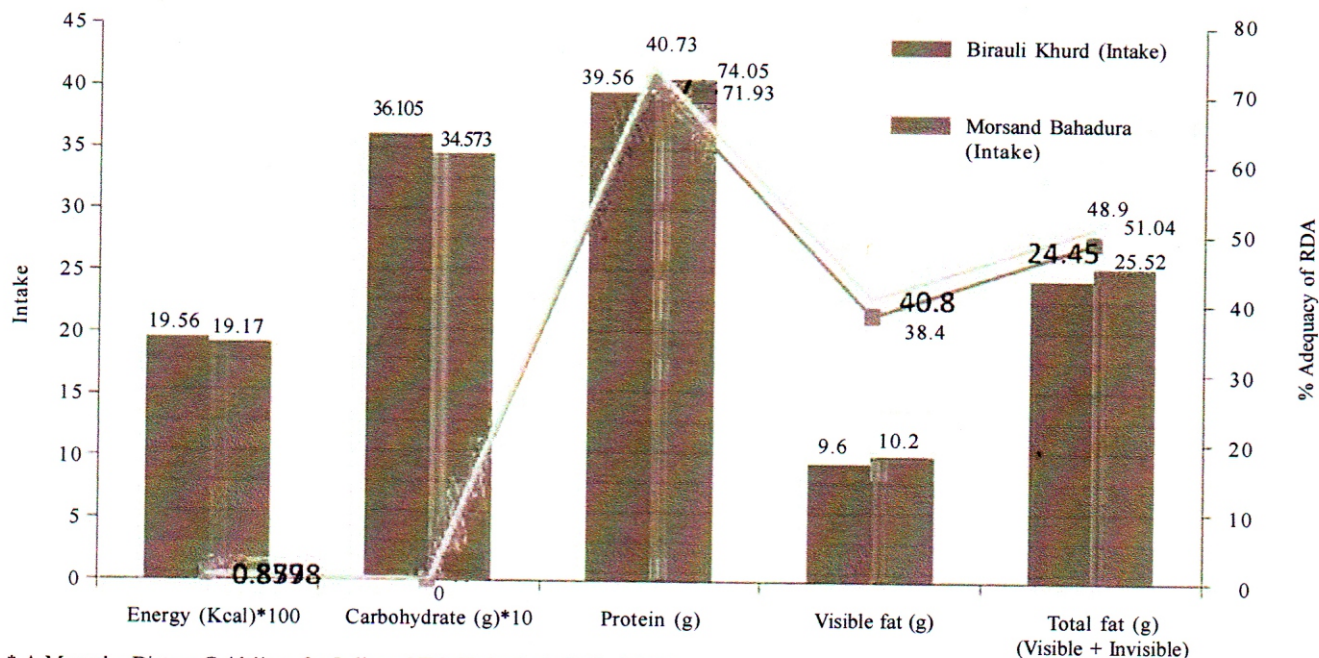
It is evident from the data of the above Fig. 2 that there was marginal inadequacy of energy intake for the respondents of the villages, 87.7 per cent and 85.98 per cent for Birauli Khurd and Morsand Bahadura, respectively. Major requirement of energy was met out through consumption of cereals and roots and tubers.

Intake of carbohydrate foods was 361.05 with a SD of ± 39.43 for the respondents of village Birauli Khurd. Intake of carbohydrate foods for the respondents of Morsand Bahadura was also at par with the respondents of Birauli Khurd *i.e.* 345.73 with a SD of ± 32.6 . This nutrient contributes to a major source of diet of the respondents.

There was acute inadequacy of protein intake for the respondents of both the villages. The protein requirement was mainly met out through cereals and to some extent from pulse consumption. The protein adequacy was 71.93 per cent with a SD of ± 6.21 for the respondents of Birauli Khurd and 74.05 per cent with a SD of ± 6.70 for the respondents of Morsand Bahadura.

There was severe inadequacy of visible fat and total fat intake of the respondents of both the villages. Adequacy of visible fat intake was 38.4 per cent with a SD of ± 2.32 for the respondents of Birauli Khurd while it was 40.80 per cent with a SD of ± 3.51 in Morsand Bahadura. Similarly adequacy of total fat intake was 48.90

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* A Manual - Dietary Guidelines for Indians, NIN, Hyderabad, 2011, 2nd Ed.

Fig. 2: Mean nutrient intake of the respondent

per cent with a SD of ± 5.70 in Birauli Khurd and 51.04 per cent with a SD of ± 5.92 in Morsand Bahadura. The adequacy of fat intake was just half of the RDA.

On comparison of the nutrient adequacy of the respondents of both the villages, it can be inferred that the adequacy of energy and carbohydrate intake of the women of Birauli Khurd was more than that of the Morsand Bahadura while adequacy of other nutrients like protein, visible fat and total fat of the women of Morsand Bhadura was more than that of Birauli Khurd.

Conclusion :

It can be concluded from the findings of this study that the nutritional status of the rural women is poor in terms of food intake and adequacy of nutrient. This is one of the major factors for wide prevalence of malnutrition among women and children. The food intake in terms of quantity as well as quality should be improved which is possible if their income is improved through income generating skills and education and awareness is created among the rural people.

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