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Anthropometric assessment: A direct indicator of nutritional status of rural women of Bihar

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Anthropometric measurement of an individual is the best parameter to assess nutritional status at the individual level. The study was conducted on 60 rural women from Bihar from two villages of Pusa block, Samastipur to assess anthropometric status of the respondents as indicator of their nutritional status. Mean age of the respondents of village Birauli Khurd is 30.37 and of village Morsand Bahadura is 30.80 years. 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. Mean height of the respondents of both the villages was 148 cm each. Their mean height was 90.24 per cent of the NCHS Standard. Mean weight of the respondents of Birauli Khurd was only 76.06 per cent of the NCHS Standard while that of Morsand Bahadura was only 74.67 per cent of the NCHS Standard. Majority of the respondents (53.33%) from Birauli Khurd had BMI between 18.0- 25.0 which is the normal range as classified by James *et al.* (1988). Majority of the respondents (60.0%) of Morsand Bahadura had a normal BMI in the range of 18.0- 25.0.

Key Words : Anthropometric assessment, Nutritional status, Rural women

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INTRODUCTION

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.

Anthropometric measurement of an individual is the best parameter to assess nutritional status at the individual level. Nutritional anthropometry has been defined as the measurement of the variations of the human body at different age levels and degree of nutrition (Jelliffe, 1966). Anthropometric measurements are the outcome of change in various socio-economic indicators, health, environmental sanitation and other factors. Identification and classification of individuals from mild to moderate malnutrition as well as severe status of malnutrition is possible with anthropometry. Anthropometric methods are used to evaluate changes in the nutritional status over a period and from one generation to the other.

Anthropometric measurements are precise, accurate and help to assess the health and nutritional status directly. But sometimes, nutritional anthropometry is unable to distinguish disturbances in growth or body composition induced by nutrient deficiencies and imbalances.

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

– To study profile characteristics of the respondents.

– To assess anthropometric measurements of the respondents.

METHODOLOGY

The study work was carried out in the state of Bihar.

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Out of 38 districts, one district namely Samastipur was randomly selected. One block from Samastipur district namely, Pusa block was randomly selected. 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 rural women and anthropometry assessment were collected using a structured interview schedule.

Anthropometry assessment :

Weight:

Weight of the sample was recorded using weighing machine in Kilogram. While measuring, care was taken to ensure that the respondents had minimal clothing and they were asked to look straight with their head and feet parallel to the ground.

Height:

Height of the respondents was measured using a measuring tape of 2.5 meters length. Height was measured with bare heels together, buttock, shoulder and back of the head touching the upright tape and arms lying at the sides in a natural manner.

Body mass index:

BMI was calculated using the following formula:

$$\textbf{BMI} = \frac{\textbf{Weight in kg}}{\textbf{Height in m}^2} \times \textbf{100}$$

Table A : BMI classification (James *et al.*, 1988)

Sr. No.	BMI	Nutritional grades
1.	< 16.0	III degree CED
2.	16.0-17.0	II degree CED
3.	17.0-18.0	I degree CED
4.	18.0-25.0	Normal
5.	25.0-30.0	Over weight
6.	30.0	Obese

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 anthropometry 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.

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

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.

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

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

Birauli Khurd and 33.33 per cent respondents from Morsand Bahadura had studied upto middle level of school.

Only 6.67 per cent of the respondents from both the villages had attended high school. The data of the Table 2 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 the table.

It is observed from the Table 3 that all the respondents (100%) from Birauli Khurd belonged to scheduled caste. All of them belonged to 'chammar' caste *i.e.* shoemaker community.

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

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).

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.

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

It is evident from the table that all the respondents from both the villages were married.

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 6 represents age of the 1st child birth. It can be seen from the table 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.

Table 6 : Age at 1st child birth

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

Figures in parenthesis indicate per cent

While 36.67 per cent and 50 per cent of the 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 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.

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

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 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 9 depicts family size of the respondents. It can be observed from the data of this table 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.

Anthropometric assessment :

Height for age of respondents :

Height of the respondents was measured with a measuring tape of 2.5 meters in length. Perusal of Fig. 1 shows that the mean height of the respondents of both the villages was 148 cm each along with a standard deviation of ±7.0 for Birauli Khurd respondents and ±5.0 for respondents of Morsand Bahadura, respectively.

The mean height was assessed with the NCHS Standard and expressed in terms of percentage. From the figure it can be noted that their mean height was 90.24 per cent of the NCHS Standard, which is 164 cm for women who are above 18 years of age. It is also interesting to note that there is no difference in the mean height of the respondents from both the villages.

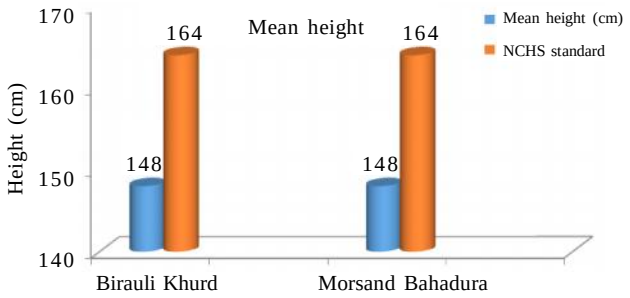

Fig. 1 : Mean height of the respondent

Weight for age of respondents :

Weight of the respondents was measured with a weighing balance and expressed in kilogram.

On perusal of Fig. 2, it can be observed that the mean weight of the respondents of Birauli Khurd was 41.05 kg with a standard deviation of ±5.80 kg. Mean weight of the respondents of Morsand Bahadura was 40.32 kg with a standard deviation of ±5.19kg.

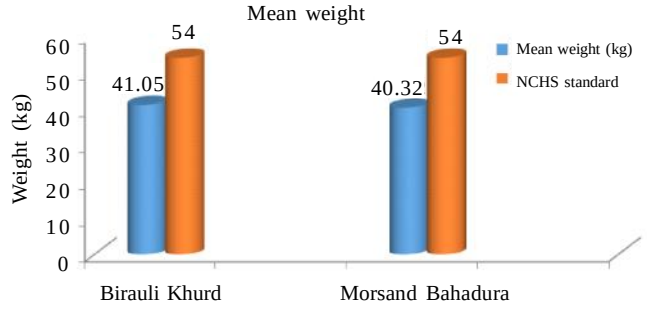

Fig. 2 : Mean weight of the respondent

This data was assessed with the NCHS Standard and expressed in terms of percentage. It is seen that the mean weight of the respondents of Birauli Khurd was only 76.06 per cent of the NCHS Standard while mean weight of the respondents of Morsand Bahadura was only 74.67 per cent of the NCHS Standard.

It can be inferred that the mean weight of the respondents is much below the NCHS standard. Also the low weight for age of the respondents reflects their poor nutritional status in general.

Also there is only slight difference in the mean weight of the respondents of both the villages.

Body mass index of the respondents :

BMI of the respondents was calculated based on their height and weight records.

It can be observed from the data of the following Table 10 that the mean BMI of the respondents of Birauli Khurd is 18.42 with a standard deviation of ±1.47. Mean BMI of the respondents of Morsand Bahadura is 18.79 with a standard deviation of ± 2.42.

Table 10 : Body mass index of respondents

BMI	Birauli Khurd (n=30)	Morsand Bahadura (n=30)
Mean	18.42	18.79
Standard deviation	± 1.47	± 2.42

It can be noted that the mean BMI of the respondents is just on the lower end of the normal BMI range of 18.0 – 25.0. Also the mean BMI of the respondents of both the villages is nearly the same.

Classification of the respondents on the basis of their BMI :

The following Fig. 3 represents data regarding classification of the respondents on the basis of their BMI.

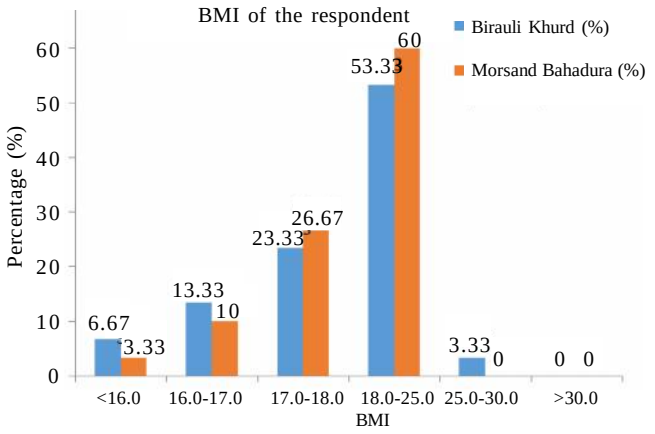

Fig. 3 : Classification of the respondent as per the BMI (James *et al.*, 1988)

It can be observed from the figure that majority of the respondents (53.33%) from Birauli Khurd had BMI between 18.0- 25.0 which is the normal range as classified by James *et al.* (1988).

23.33 per cent of the respondents from Birauli Khurd had a BMI between 17.0 – 18.0 and hence suffers from I Degree CED while 13.33 per cent of the respondents were suffering from II Degree of CED with a BMI range of 16.0- 17.0. 6.67 per cent of the respondents were suffering from III Degree CED with a BMI of <16.0. Only 3.33 per cent of the respondent was overweight

with a BMI range of 25.0 – 30.0. while none of the respondent fell into obese category.

Majority of the respondents (60.0%) of Morsand Bahadura had a normal BMI in the range of 18.0- 25.0. 26.67 per cent of the respondents fell under I Degree of CED with a BMI range of 17.0- 18.0. 10.0 per cent of the respondents were suffering from II Degree of CED with a BMI range of 16.0-17.0. Only 3.33 per cent of the respondents were suffering from III Degree CED with a BMI of <16.0. None of the respondents fell under 'overweight' and 'obese' category.

Conclusion :

The findings of this study highlight that the anthropometry status of the women are much below the NCHS standard, which is a direct reflection of their poor nutritional status. Though the BMI is within the normal range yet it is just on the lower end. Hence, it is concluded that there is a need to create awareness among rural women about importance of nutrition in the well being of the women and their offspring. Since majority of the women got married below 18 years and also delivered their first child below 19 years, so it draws the attention of the development organisations also to educate women about the consequences of early marriage and early pregnancy. Education on adequate nutrition right from childhood of girls should be promoted so that it does not lead to chronic malnutrition.

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