



# **A Study on the Health and Nutritional Status of Mawasi Tribal Women in Villages of Chitrakoot Region in Madhya Pradesh, India**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author SN designed the questionnaire, performed the study and authors AJ and RSN perform the data analysis and paper writing work. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The present study is a cross sectional survey in which an attempt was made to understand the socio- demographic profile and assess nutritional status of Mawasi tribal women in Majhgawan block of Satna district in Madhya Pradesh. The sample comprised of 100 females between the age groups of 18-46 which were selected from 100 households for assessment of health and nutritional status. Stratified random sampling method was used for selection of 5 villages. The primary tool in the study was predesigned and pretested interview schedule. Height, weight recording, clinical examination and body type of females were the part of the study. The design of the study is qualitative that include data from 100 in depth interviews with the mothers. To calculate nutrient intake, twenty –four hour dietary recall method was adopted and was compared with the RDA-2020 given by ICMR. Nearly half (51%) females were short stature and thin. 79 % women were suffering from severe to moderate anemia. Daily intake of foods were deficit in vitamin A (75.5%), vitamin C

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(54.83%), folic acid (70.32%), Vitamin B12 (63%), iron (61.43%) and calcium (47.67%) nutrients. The mean weight of the female was 42.72 Kg. The vast majority (92%) of females had weight less than the weight of the reference women (55Kg). The mean body mass index was 19.39. Only one-third (32%) females were normal (BMI 20.0-25.0). More than half (51%) of the study women suffered from chronic energy deficiency (BMI < 18.5). 98 % women were found anemic according to the cut-off (Hb < 12.0g/dl) proposed by WHO. The overall nutritional status of the tribal females was poor and their nutrient intake was also insufficient showing high percentage deficit in calories, proteins, fats, iron, zinc, calcium and vitamins A, B and C intake. Nutritional anemia, Vit-A and vit-C, Vitamin B12 deficiencies were common problems in Mawasi women.

**Keywords:** Mawasi tribal; health problem; clinical examination nutrient intake; anthropometric indices; anemia.

## 1. INTRODUCTION

“A female’s health status has a significant effect on the health and well-being of the whole family. Maternal morbidity and mortality affect not only the mother but the entire family. Most often, women not only shoulder the responsibility of home management and child care, but are also actively involved in economically gainful employment outside the household or even contribute significantly in the family business, be it agriculture or industry. They also play an important role in rural economy, yet their health has always been neglected. In developing countries like India discrimination against women begin from the birth and continues till her last breath. Differences frequently emerge in consideration of health and nutritional status between the sexes. Throughout their life cycles female receive less food and also inferior quality of foods than do male” [1,2].

“The latest National Family Health Survey report (2019–21) significantly shows that, nearly 13% of Indian women are underweight. Almost 17.4% of tribal reproductive women belong to underweight. According to some recent studies, malnutrition affects 25.3% of tribal women in India” [3].

“According to Census report 2011 tribes constitute 8.6% of India's total population or about 104 million in numbers, which is almost half of the world total tribal population” [4]. Scheduled Tribes are viewed as the lowest strata of the community due to their primitive lifestyle, poverty, illiteracy and isolated geographical area [5]. Most of the tribes still live far from main stream development, near the forest area and are fully dependent on forest produce, herbs, woods etc. Their poor living conditions, eating habits and limited access to public services make them more susceptible to all sorts of health

problems and have an adverse effect on their nutritional status [6]. Thus they are considered to be vulnerable groups of the society, among them women are more vulnerable, firstly due to their tribal status and secondly due to their gender [7,8].

This study focuses on the assessment of health and nutritional status of Mawasi tribal women. It also explores the relation of socio demographical factor with health status of these disadvantaged women of Chitrakoot region, Madhya Pradesh. The study will provide an insight to the government bodies about the current situation of malnutrition among the Mawasi tribal women, which can be further utilized for improving the health care services and policy making.

It was observed that even after 72 years of Independence, the Mawasi community, a Scheduled Tribe that lives in the hills of Madhya Pradesh is deprived of many facilities and are still dependent on collecting forest produce for generating income. Their poor health condition and nutritional status has been neglected due to their small population. There has been no such study in the past focusing on problem faced by these tribal women which could have shed some light on this issue. Keeping in view all the above aspects, the present study has been undertaken with the following objectives:

- To study socio-demographic characteristic of Mawasi tribe women.
- To evaluate nutrient and food intake of Mawasi tribal women using 24hr dietary recall method.
- To analyze dietary pattern using food frequency questionnaire.
- To assess nutritional status in terms of anthropometric measurements, clinical examination and biochemical analysis.

## 2. METHODOLOGY

### 2.1 Study Setting

The study was carried out among mawasi tribe, living in villages of Majhgawan block of Chitrakoot region.

### 2.2 Research Design

A Cross sectional community based survey was carried out.

### 2.3 Sampling Design

A stratified random sampling technique was used to select the study subjects. According to the inclusion criteria 100 women between 18-46 year in the child bearing age group, were selected out of 867 women in the selected five villages.

### 2.4 Data Collection Tool

A predesigned and pretested interview schedule was used to collect the data. Socio demographic variables included in the interview schedule were education, type of family, occupation, number of children, source of drinking water, agriculture land and personal ill habits of mawasi tribal women.

For analysis of nutritional status of tribal women direct method of nutritional assessment were included. Anthropometric method included height and weight measurement. For determining the hemoglobin level of tribal women hemoglobin meter was used. In clinical assessment general appearance of women was observed. A 24hr dietary recall method and food frequency questionnaire were used to determine the dietary intake. And RDA – 2020 for adult moderate women and Indian food composition table was used to compare and calculate the nutrients consumed such as energy, protein, fat, calcium and iron.

### 2.5 Statistical Analysis

Data was entered in ms – excel, descriptive analysis (mean and standard deviation) was performed using SPSS and presented logically in form of table and graphs.

## 3. RESULTS AND DISCUSSION

### 3.1 Socio-economic Characteristics

Socio demographic data of 100 mawasi tribal women in the age group of 18 -46 years was

collected and presented in Table 1. The data depicts that there were 49% women in the age group of 18-30 year age and 51% between the age of 31-46 year .Out of 100 women 58% women are illiterate and only 11% woman are educated up to class 10<sup>th</sup> and above. This indicated that literacy rate among Mawasi tribal women is very low as compared to the literacy rate of women (62.45%) of this district Satna as per census 2011. Majority (97%) of women are living in nuclear family, which shows the decreasing joint family trend among Mawasi tribal. Similar results were reported in a study where it was found that 80% tribal women living in nuclear family in village of phansidewa block in Darjeeling District [9]. Most (62%) of them are working as a labour having no agricultural land, where as 38% are involved in farming. In regards of number of children, all of them had children and majority (77%) of women had more than 2 children. Majority of the samples (79%) had total family members consisting of 4-8 family members, 7% had 1-4 family members and 18 % had more than eight family members. A study reported similar findings that 70.96% had total family members ranging from 7-9 family members [8]. "Similar study also revealed 76.25% respondents have five family members. The family size and pattern depicted that most of them are living in nuclear families and the family size consisted of 4-8 members and majority of them have more than 3-4 children. Due to ignorance, lack of knowledge, illiteracy and for social security reasons, they preferred to give birth to more children"[10].

The sources of drinking water used are more preferably hand pump (59%) and dug well (38%). In case of agriculture land possession 62% women did not have any agriculture land and thus are earning money by labour work where as those having agriculture land are involved in farming. It has been observed that more than half (56%) of women have a habit of chewing tobacco where as 44% of women are not having such ill habits. Majority of the farm families (57%) reported that they have annual income less than 25000. Only 2% women reported that they have their income above 1 lac rupees per annum.

### 3.2 Clinical Examination

Medical officer of Community health Centre (CHC) examined each women for any possible medical signs or symptoms of health problems and general appearance.

**Table 1. Socio demographic Characteristic of the tribal women (N=100)**

<b>Socio demographic variable</b>		<b>Frequency</b>	<b>Percentage</b>
Age group	18- 30 years	49	49
	31- 46 years	51	51
Education	Illiterate	58	58
	primary	24	24
	Middle	7	7
	Matric	6	6
	Intermediate	5	5
Type of Family	Nuclear	97	97
	Joint	3	3
Occupation	Farming	38	38
	Labour	62	62
No. of Children	One	4	4
	Two	19	19
	Three	28	28
	Four	32	32
	More than Four	17	17
Family Size	Less than 4	7	7
	5 - 8	79	79
	Greater than 8	18	18
Source of Income	Agriculture	9	9
	Agriculture + Agri.Labour	8	8
	Forest Produce collection + Agriculture	21	21
	Forest Produce collection +Agriculture Labour	62	62
Agricultural land	No Agricultural Land	62	62
	Less than 1 ha	23	23
	1- 2 ha	13	13
	More than 2 ha	2	2
Family Income/annum	Less than 25000	57	57
	25000 to 50000	24	24
	50000-75000	13	13
	75000-100000	4	4
	Above 100000	2	2

**Table2. Data showing general appearance on inspection of mawasi tribal women**

<b>General Appearance</b>	<b>Frequency</b>	<b>Percentage</b>
Tall and thin	4	4
Tall and stout	3	3
Short and thin	51	51
Short and stout	7	7
Short and average weight	12	12
Average height and thin	17	17
Average Height and average weight	6	6
<b>Total</b>	<b>100</b>	<b>100</b>

### 3.2.1 General appearance of the females

During the clinical assessment of mawasi tribal women their general appearance in terms of height, distribution of fat body and the muscle has been carefully observed just to get clues on

to their health and nutritional status. Table 2 shows the findings recorded on the general assessment of nutritional status of the tribal females. "The result shows that 51 %of the Mawasi women were short in height and thin in built. This indicates that nearly half of the

females were under-nourished. Furthermore, 17% females were of average height and thin which also adds to the percentage of undernourished females. Only 6 % of females were of average height and weight. These findings are similar to the results obtained in the study conducted on tribal women in Naugarh block, Chandouli district, found that maximum percentage of females (46.8%) were short stature" [11].

### 3.2.2 Health problems experienced by Mawasi tribal women

Information on frequency of experiencing health problems related to nutrient deficiencies in last three months were collected based on major five symptoms such as fatigue, weakness, backache, dizziness, and insomnia considering deficiency of nutrients like iron, folic acid, vitamin B12 and calcium and are presented in Table 3. The respondents were expected to answer in terms of frequently and rarely. The results indicates that 71 percent of respondents experienced fatigue frequently and 29% experienced it rarely, Weakness was experienced by 57 per cent and 43 per cent respondents frequently and rarely respectively whereas 49 per cent of respondents experienced backache frequently and 51 percent experienced rarely. There were 63 per cent women who experienced dizziness frequently and 37 percent rarely. Insomnia was experience by 55 per cent and 45 per cent women frequently and rarely respectively.

### 3.3 Anthropometric Measurements of Mawasi Tribal Women

The anthropometric measurements observed for the study were the height and the weight of the respondents using standard equipments. Based on the weight and height of the respondent the BMI was also calculated and the observations are presented in Table 4. and Figs. 1 & 2.

#### 3.3.1 Weight

The mean weight of Mawasi tribal women (non pregnant women) was 42.72 Kg, which was much less than the weight of (50 Kg) reference women. Proportion wise nearly one-fourth (32 %) females had weight below the cut-off point for mothers at risk and about 97.0% of females weighed less than the weight of reference women (55 kg) as per RDA 2020. If <45 kg is taken as a cut-off about two third (77 %) of females would be categorized as low weight.

This figure is relatively low in comparison to two other tribal studies where percentage of low weight non pregnant and non lactating women (less than 45 kg) was found to be 70 % among tribal women in Baran district of Rajasthan respectively [12]. However, nearly one-fourth (32 %) females in this study whose weight was less than 40Kg were at substantially risk for future pregnancy complication.

Fig. 1. shows the weight of women of different age, which ranged between 31.72 – 78.5 kg and the mean weight of women, has been noted  $42.72 \pm 6.69$  kg.

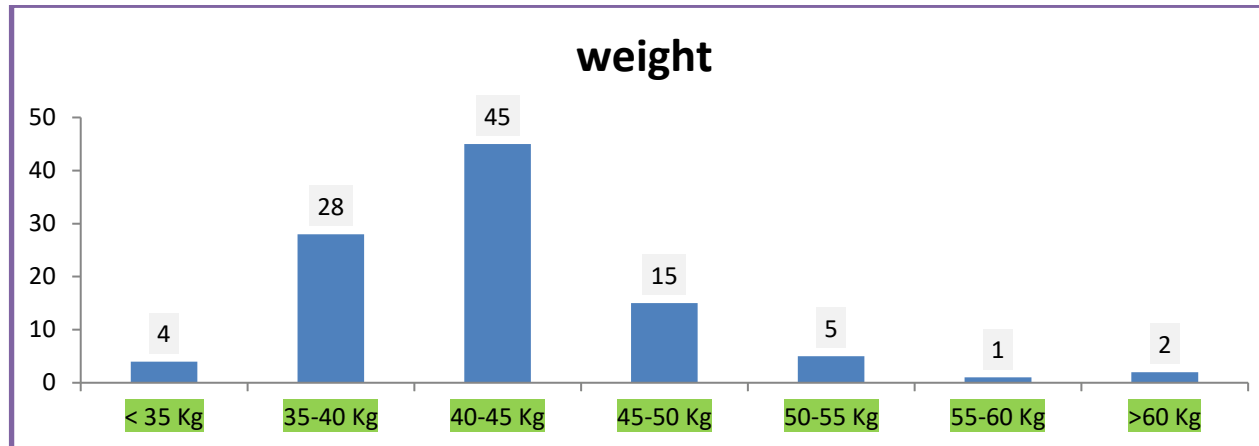
#### 3.3.2 Height

The height of an adult is an outcome of several factors including nutrition during childhood and adolescent. The heights of women ranged from 137 cm to 159 cm with a mean height of  $148 \pm 0.04$  cm. In a similar study conducted among lodha tribal women, the mean height of the tribal women was  $146.6 \pm 5.5$  cm and was 94.7% of the standard value [13]. Further, It is commonly believed that women in all tribal areas are shorter than their state or national figures. In the present studies 23 % women are found to have height less than 145 cm. In present study, vast majority of women belong to low income group, therefore their heights have hardly any effect on birth weight of their babies, as later is influenced mainly by low income. The result shows that 71% women have height less than the height of reference women (151cm) as per RDA 2020. Nonetheless 71% women with height less than 150 cm reflect under nutrition during their childhood and adolescent.

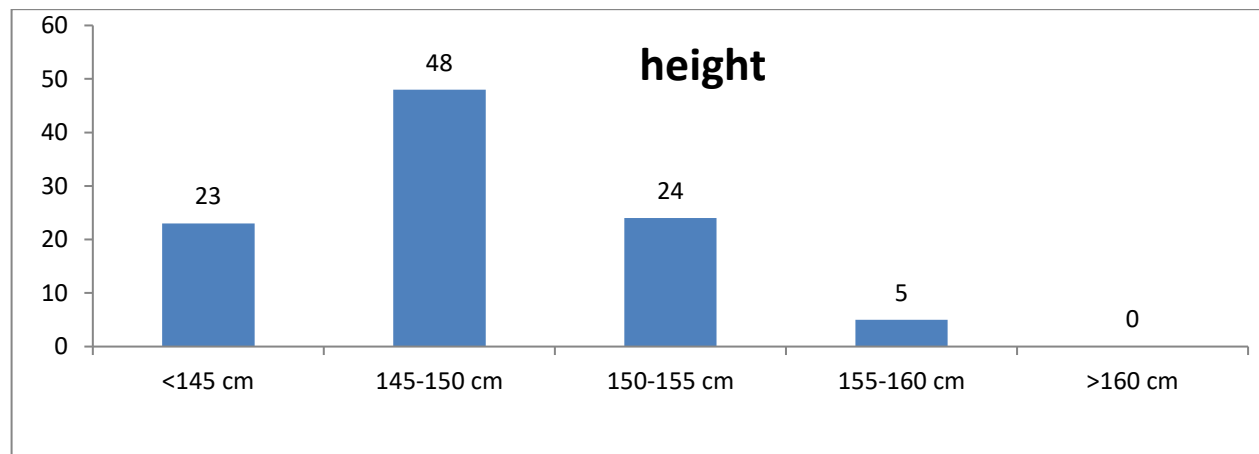
Fig. 2. shows the height of women of different age. It ranges between 137 - 159kg and the mean height of women has been noted  $148 \pm 0.04$  kg.

#### 3.3.3 Body Mass Index (BMI)

In the present study (Table 5) it has been found that more than half (51%) of the study women suffered from chronic energy deficiency (BMI < 18.5). Similar result has been found in the study conducted in chandouli district were 56.7% of the women were observed to suffer from chronic energy deficiency [11]. "In present study, among chronically nutritionally deficient women, maximum percentage (41.0%) belonged to grade -III CED (mild malnutrition) followed by grade -II CED (7.0%) and grade I CED (3%).



**Fig. 1. Showing average weight (Kg) of mawasi tribal women**  
*Mean: - 42.72, SD [±].69, Range: - 31.2 - 78.5*



**Fig. 2. Showing Average height (cm) of Mawasi tribal women**  
*Mean: - 148, SD+- 0.04, Range: - 137 - 159*

**Table 3. Health Problems experienced by Mawasi tribal women**

Symptoms	Category	Frequency	percentage
Fatigue	Frequently	71	71
	Rarely	29	29
	Total	100	100
Weakness	Frequently	57	47
	Rarely	43	53
	Total	100	100
Backache	Frequently	49	49
	Rarely	51	51
	Total	100	100
Dizziness	Frequently	63	63
	Rarely	37	37
	Total	100	100
Insomnia	Frequently	55	55
	Rarely	45	45
	Total	100	100

**Table 4. Distribution of females according to their weight and height excluding pregnant women**

Anthropometric measurement		
A. Weight in Kg	Number	Percent
< 35	4	4
35-40	28	28
40-45	45	45
45-50	15	15
50-55	5	5
55-60	1	1
>60	2	2
Total	100	100
Mean $\pm$ SD :- 42.72 $\pm$ 6.69	Range- 31.2 - 78.5	
B. Height (in cm)		
<145	23	23
145-150	48	48
150-155	24	24
155-160	5	5
>160	0	0
Total	100	100
Mean $\pm$ SD:- 148 $\pm$ 0.04	Range- 137 - 159	

**Table 5. Body Mass Index(BMI) of Mawasi tribal women**

Class	BMI	Frequency / percentage
CED Grade I( Severe)	< 16.0	3
CED Grade II( Moderate)	16.0 -17.0	7
CED Grade III( Mild)	17.0 - 18.5	41
Low Weight- Normal	18.5- 20.0	15
Normal	20.0 - 25.0	32
Obese	> 25.0	2

Body Mass Index (BMI) is the most widely accepted and used index for assessing nutritional status of adult population. It is used as an index to assess the extent of Chronic Energy Deficiency (CED) in adults. Therefore, the use of BMI and WHO BMI based cut-off point (Asian

population) for the evaluation of under-nutrition is expropriated for use among the tribal populations of India"[14]. "Studies worldwide and from India have utilized BMI to study nutritional status of the tribal population"[15]. The Chronic Energy Deficiency (CED) is associated with impaired

physical capacity, reduced economic productivity, increased mortality and poorer reproductive outcomes. Some evidence in developing countries indicates that malnourished women with a Body Mass Index (BMI) below 18.5kg/m<sup>2</sup> show a progressive increase in mortality rates as well as increased risk of illness. In the present it was found that in case of mawasi tribal women the BMI was higher (20.09) in above 30 year age group and lower (17.17) in the 18-30 years age group.

### 3.3.4 Association between Socio-demographic and BMI

The data on association between socio demographic data and women having BMI < 18.5 are presented in Table 6. It is visible in the result that 65.31% women belonging to 18-30 year age group were underweight as per WHO BMI classification. Whereas women who were illiterate were having a poor nutritional status and thus 77.42% of illiterate women were having a BMI less than 18.5. Out of 62 women 67.74% of women having no agriculture land had a BMI less than 18.5, which shows that women growing their own food had a less chance of being underweight. It should also be noted that women having a habit of chewing tobacco are more likely (73.21%) of having a BMI less than 18.5. In a previous study, the nutritional status of 1, 66,172 schedule tribe women from National Family Health Survey (NFHS-5) was analyzed and a multinomial logistic regression model was used

to analyze how different factors are associated with BMI. The result of the study shows that most of the socio-demographic factors were associated with nutritional level among Scheduled tribe women [5].

### 3.4 Prevalence of Anemia in Mawasi Tribal Women

The data presented in Table 7 and Fig. 3 shows that the prevalence of anemia among mawasi tribal women was 98% with hemoglobin values below 12 g/dL. Among the subjects, 8% women were severely anemic, 71% were moderately anemic, and 19% were mildly anemic. The result of the anemia is higher in comparison to the anemic study conducted in the tribal settlements of Karadukka block panchayath of Kasaragod district where he found that the majority (89%) of the tribal women had anemia with 62% and 11% of tribal women had moderate and severe anemia, respectively [16]. "According to National Family Health Survey (2015–2016), nearly 54% of women in the reproductive age group suffer from anemia. A study revealed that factors such as wealth index, rural/urban residence, and education do have a negative association with anemia, i.e. if these factors increase anemia level decreases. Other significant and less explored factors include the type of contraception usage, type of diet, access to improved sanitation facilities, and the number of birth last year" [17].

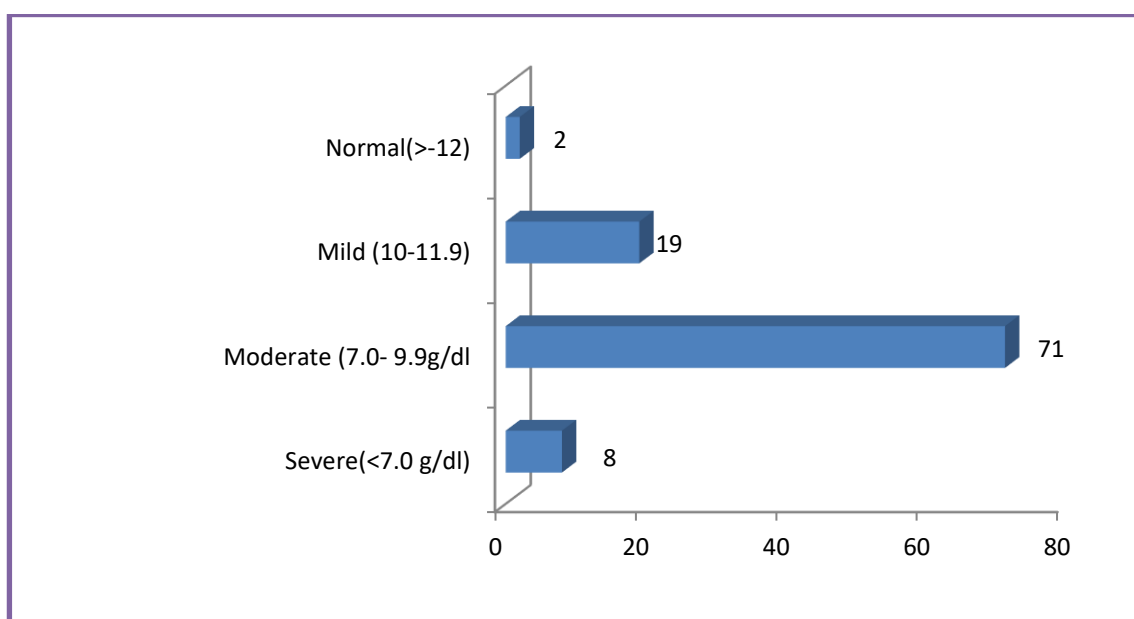


Fig. 3. Prevalence of Anemia among Mawasi tribal Women



**Table 6. Socio – demographic variables associated with BMI of mawasi tribal women**

Socio demographic variable		Frequency / Percentage	BMI (<18.5)	
Characteristics	Sub-category		frequency	Percent (%)
Age group	18- 30 years	49	32	65.31
	31- 46 years	51	19	37.25
Education	Illiterate	31	24	77.42
	Literate	27	17	62.96
	Primary	24	6	25.00
	Middle	7	2	28.57
	Metric	6	1	16.67
	Inter mediate	5	1	20.00
Type of family	Nuclear	97	49	50.52
	Joint	3	1	33.33
Occupation	Farming	38	9	23.68
	Labour	62	42	67.74
No. of children	<= 2	23	16	69.57
	>2	77	35	45.45
Source of Drinking water	Hand pump	59	37	62.71
	Dug well	38	14	36.84
	Bore well	3	0	0.00
Agricultural land	No agriculture land	62	42	67.74
	Less than 1 ha	23	6	26.09
	1-2 ha	13	3	23.08
	More than 2 ha	2	0	0.00
Personal ill habits	No	44	10	22.73
	Chewing tobacco	56	41	73.21

**Table7. Prevalence of Anemia among tribal Women**

Age Group	Severe(<7.0 g/dl)	Moderate (7.0- 9.9g/dl)	Mild (10- 11.9)	Normal(>- 12)	Total
18- 25	0	10	2	1	13
26-30	0	30	6	0	36
31- 35	2	17	4	0	23
36-40	3	6	3	1	13
41-45	3	7	3	0	13
Above 46	0	1	1	0	2
	8	71	19	2	100

**Table 8. Dietary intake by 24 hour food recall method**

Nutrients	Mean Intake	RDA	% of Deficiency
Energy(kcal/d)	1618 ±201.42	2230	27.44
Protein(g/d)	37.4± 6.92	55	32.00
Fat(g/d)	18.3± 3.48	25	26.80
Iron(mg/d)	8.1± 2.34	21	61.43
Calcium(mg/d)	314± 182.41	600	47.67
Zinc(mg/d)	5.82 ± 1.32	10	41.80
Vitamin A(microg/d)	1176 ± 238.9	4800	75.50
Thiamin (mg/d)	0.89± 0.3	1.1	19.09
Riboflavin(mg/d)	0.73± 0.34	1.2	39.17
Niacin (mg/d)	9.94± 6.62	14	29.00
Folic acid(microg/d)	59.37± 15.04	200	70.32
Vitamin B-12(microg/d)	0.37± 0.43	1.0	63.00
Vitamin C(mg/d)	18.07±13.41	40	54.83

**Table 9. Frequency of food group intake**

S.No.	Food Groups	Daily	Twice a week	Weekly	Twice a month	Monthly
1	Cereals	100	0	0	0	0
2	Pulses and legumes	29	53	18	0	0
3	Milk & milk products	3	17	29	33	18
4	Green leafy vegetables	89	11	0	0	0
5	Roots and tubers	100	0	0	0	0
6	Other vegetables	16	34	39	11	0
7	Fats and oils	100	0	0	0	0
8	Fruits	0	3	23	39	35
9	Sugar & Jaggery	100	0	0	0	0
10	Meat, eggs, fish and poultry	0	0	5	13	16

### 3.5 Dietary Intake

#### 3.5.1 Nutrient intakes

24 hr dietary recall method was used to measure the quantity of foods eaten by woman during the last 24 hrs. The food eaten was converted into grams and nutrients intake were calculated as per Indian food composition table and compared with the recommended dietary allowance (RDA 2020). Nutrient intake by woman the data depicts that the overall median intakes of various nutrients were lower than the recommended RDAs by tribal mawasi women (Table 8). The intake of various nutrients energy (24.77%), protein (32%), Fat (26.80%), Calcium (47.67%), Iron (61.43%), Vitamin-A (75.5%), and Riboflavin (39.17%), vitamin B12 (63%), thiamin (19.09%), folic acid (70.32%) & vitamin C (54.83%) was deficit to RDAs.

#### 3.5.2 Frequency of food group Intake

Apart from 24hr dietary recall food frequency questionnaire was used to study the consumption of various food groups by the subjects. When it is used with 24hr dietary recall it improves the accuracy to estimate the intake of the nutrients. The frequency of intake of different food groups gives an insight to the different nutrient deficiency which can occur in the long term. The data collected on the frequency of food intake are given in Table 9. The data revealed that only foods from four groups are consumed by Mawasi tribal on daily basis. These food groups were cereals, roots and tubers, fats and oils and sugars & jaggery. It was the fruits, milk and milk products and fruit vegetables, pulses and legumes which were greatly deficit in their

daily diet. The daily intake of milk (3%), fruit (0%), other vegetables (16%), pulses (29%) and non vegetarian food (0%) is very low.

A similar study showed that diet of tribal women lacked fruits, vegetables and dairies leading to low micronutrients [18].

### 4. CONCLUSION

From the present study it can be concluded that the overall nutritional status of the tribal females was poor and the high prevalence of anemia proves that their dietary intake was also insufficient showing high percentage deficit in calories, proteins, fats, iron and calcium. Thus the special needs of women should be recognized, also it should be noted that tribes are different from villagers mawasi tribes is totally dependent on forest for their basic needs, as the time has passed forest has been shrinking, causing the lack of resources and poor quality of lifestyle thus leading to nutritional inadequacy and deficiency diseases. In this particular study also, it has been seen that the socio demographic conditions has a significant impact on BMI of the women.

Due to their small population they are always get neglected in any policy run by government. Thus for improving their miserable living conditions and for creating awareness toward healthy life style frequent trainings, exposure visit and awareness programmes need to be arranged for them. An attempt to make them self-sufficient should be made. The strategies must be properly planned from the bottom level approach considering sustainable food and adequate nutrition for health and nutritional development of Mawasi tribal women.

## CONSENT

The written consent from the selected family head was obtained for conducting clinical and anthropometric tests. Guardian or family head sign or thumb print on the consent form were taken for participation in the study.

## ETHICAL APPROVAL

Prior to the study, the District Health Administration (DHA) and the Community Health Centre (CHC) in Majhgawan block were officially informed.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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