# Assessment of Nutritional status of 3–8-year Mawasi tribal Children using anthropometric Indices

ABSTARCT

*Nearly 45 lakh children, mostly tribal suffer from stunted growth in Madhya Pradesh. Hence a cross sectional study was undertaken in two villages of Majhgawan block in whichheight, weight, and mid upper arm circumference of 112 Mawasi tribal were measured and recorded via standard techniques. Body mass index was computed using the conventional method, the data was then analysed using anthro plus software of WHO. The overall prevalence of stunting among tribal children (3-5 years) was 60.65%, with 47.54% moderate and 13.11% severe stunting. The prevalence of underweight among these children was 59.03 % (47.55% moderate and 11.48 % severe). The prevalence of wasting among these children was 26.24 % (22.26% moderate acute malnutrition (MAM) and 3.28 % severe acute malnutrition (SAM)).Among 6–8-year children it was found that the prevalence of stunting and underweight was 64.36 % and 83.5 % respectively. 20.13 % of children were thin (1.81% had severe thinness, and 18.02% had moderate thinness) in 6-8 years. The prevalence of thinness among 6,7- and 8-year children was 15.38%, 20.0% and 23.50 % respectively. Thus, the overall results indicate high level of underweight and stunting,therefore,based on the results, it can be stated that there is a urgent need for lot of work to be done on improvement of nutritional and health status of Mawasi children. The hand in hand support of government and the local bodies for upliftment of tribal community can make a huge difference in current scenario.*

**Keywords:**Malnutrition,BMI,Underweight,tribal,Stunting,Wasting,Thinness, Madhya Pradesh



## Introduction

India is the fastest growing country among South Asian region in several aspect such as education, technology and economy butdespite of all the development and progress, India has not been able to counter the problem of under nutrition (The World Bank, 2019).India alone accounts for more than 61 million stunted children (low height for age), 47 million underweight children (low weight for age) and 25 million wasted children (weight for height). Estimates from the National Family and Health Survey (2015–16) also shows that in India, about 38% of the children under the age of five year are stunted (low height for age), 36% of the children are underweight (low weight for age), and 18% children are wasted (weight for height), it has also revealed that children nutritional status (stunted) among the Scheduled Caste is 43 per cent, Scheduled Tribes is 44 per cent, OBCs is 39 per cent and among General is 31 per cent. Which clearly indicates that Scheduled Tribes and Scheduled Caste children are suffering more stunted nutritional problem as compared to other children nutritional status (IIPS, IICF,2017) (Raghavendra, 2020) (Singh, *et al.*,2019)

Scheduled Tribes constitute 8.6% of India's population or about 104 million tribal individuals (Census of India, 2011). There are 645 distinct tribes in India, and the latest available data reveals that 4.7 million tribal children of India suffer from chronic nutrition deprivation

affecting their survival, growth, learning, performance in school and productivity as adults. (UNICEF)and according to UNICEF INDIA about 80 per cent of the 5 million chronically undernourished tribal children live in just eight states of Karnataka, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan and Odisha.Tribal Children at early age are more prone to be under nourished due to the lack of the awareness among the parents, like importance of breast feeding, proper nutritious food intake, immunization, care during sickness, clean drinking water, sanitation practices etc. (DeyandBisai 2019)

Madhya Pradesh is home to the largest number of Scheduled Tribes includes significant tribal population which constitutes of more than one-fourth of its total population and 14.7 percent of India's total tribal population.Madhya Pradesh consists of 46 recognized Scheduled Tribes and three of them have been identified as "Special Primitive Tribal Groups (Divya, 2017).District Satna of Madhya Pradesh is a homeland of four tribal races which includes Gond, Kol, Mawasi and Khairwar. Among these four ethnic races, Mawasi are more sensitive to nutrition and health issues because of their dependence on forest, forest produce, traditional unproductive agricultural lands that too only in monsoon, unbalanced diet deficient in micronutrients and non-availability of modern health services resulting into burden of various diseases targeting specifically to children below age of ten. Prevalence of hunger and malnutrition among children are always there in Mawasi hamlets for years together because of their forest habitats, extreme poverty and nutritional taboos. The child health and nutrition has always been sensitive core issues for this much neglected segment in this district population where malnutrition and disease burden are at their peaks almost in all three seasons. The seriousness of this issue has acted as a major motivation for conducting the study for this tribal race. The main objective of this study was to observe thevariations of anthropometry and nutritional status in the form of underweight, thinness, and stunting among tribal children aged 3-8years of the of Majhgawan block of Satna District.

## Materials and methods

***Selection of locale and study subject***

A Cross sectional community-based survey was carried outduring 2022-23 in tribal villages of Majhgawan block of Satna district of Madhya Pradesh under the guidance and technical support from Department of Food and Nutrition, MMV, BHU, Varanasi(UP) and Krishi Vigyan Kendra,Satna(MP). The list of villages having more than 50 % Mawasi tribal population was accessed from the Department of Tribal Development. Two villages with highest population of Mawasi tribal population and children's deaths during the last three years were selected for data collection.Mawasi community is a scheduled tribe that lives in the hills of Madhya Pradesh which is deprived of many facilities. These Mawasi Tribal have their distinct customs, traditions and dietary patterns. Most Mawasi villages are situated at the beginning of the forest and have pathways leading to the jungle. From food to livelihood, the forest used to be an integral part of the Mawasilife. The tribal used to collect forest produce like aonla, *Char*, *Mahua*, Ber, bael and Tendu *patta*, and tribal women are engaged in cutting and selling wood.

The various research studies have mentioned the importance of healthy dietary intake and nutritional status in the childhood for overall growth and development of an individual in early stages of their growth. Thus 3–8-yearMawasi tribal children were selected for this study through stratified random sampling. In the present Investigation, the list of 3–5-year children was collected from the nearby Anganwadi of the village with the help of child

development project officer. For selection of 6–8-year children government school were contacted for providing the list of Mawasi tribal children under this age group.

***Data collection tools and technique***

Data on age,sex,height,weight, mid upper arm circumference was collected using a pretested questionnaire and an informed consent was taken from the parents of children before collection of the data. Age of the children was recorded with the help of Anganwadi data and birth certificates provided by their parents during home visit. For anthropometric measurements standard procedures were followed.Height was measured using stadiometer, to the nearest 0.1 cm. The measurements were repeated twice to obtain two readings within 0.1cm . The average of the two closest measurements was recorded (Casadei et al. 2022). A weighing machine was used to measure the body weight to the nearest 0.5 kg. For measurement of mid upper arm circumference Shakir tape was used.

***Statistical Analysis of Data***

The nutritional status was determined using Z score analysis. Weights for height, height for age, weight for age and BMI for age are the parameters calculatedand classification of wasting, stunting and under nutrition were made on the basis of latest WHO guidelines. According to which children were considered withstunting,wasting,and underweightwhen Z score is < -2 SD, where as they are considered as moderate stunting,wasting,underweight when Z score is ranging from <-2SD to <- 3SD and severe stunting, wasting and underweight when Z score is < -3SD (World Health Organization 1995). The data was recorded and classified using anthro plus software and presented in form of tables.

## Results

***Anthropometryofchildren (Height, weight and MUAC of children)***

The data on meanheight(cm), weight(kg),andMUAC(cm) and BMIformaleandfemale childrenbyage are presented in Table 1. Themeanheightofmale and female childrenaged3- yearwas89.07cmand 90.94 cm,4- year was 96.13 cm and 98.81 cm, 5-year 97.91 cm and 101.61 cm, 6 -year was 105.75 and 105.97 cm, 7- year was 111.34 cm and 109.60 cm and 8-year was 113.45 cm and 113.53 cm, respectively. The height of the children showed an increasing trend with an increase in their age.

The mean weight of male and female children in the 3-year age group was 11.10 kg and 11.14 kg,respectively.Themeanweightwas13.75kgand14.67kgformale and female childrenaged5- years.Inthe 8-year age group, the mean weight was 18.08 and 17.58 kg for male and female children respectively. The mean MUACfor male children aged 3 year and 8 year was 14.17 cm and 16.08 cm, respectively. In female children,itwas 14.38 cm and 15.74cm at ages 3 year and 8 years respectively.

**Table 1. Mean Height, Weight, MUAC and BMI of Mawasi Tribal Children (3-8 Years)**

| Mean Height of the Boys and Girls | | | | | | |
|---|---|---|---|---|---|---|
| **Age** | **Boys** | | | **Girls** | | |
| | **No.** | **Mean Height(cm)** | **SD** | **No.** | **Mean Height(cm)** | **SD** |
| 3 | 6 | 89.07 | 2.86 | 5 | 90.94 | 1.75 |
| 4 | 19 | 96.13 | 6.38 | 9 | 98.81 | 5.31 |
| 5 | 10 | 97.91 | 3.7 | 12 | 101.61 | 5.24 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | 6 | 105.75 | 3.03 | 7 | 105.97 | 1.58 |
| 7 | 10 | 111.34 | 3.48 | 9 | 109.6 | 3.53 |
| 8 | 11 | 113.45 | 4.48 | 8 | 113.53 | 3.5 |
| **Mean Weight of the Boys and Girls** | | | | | | |
| **Age** | **No.** | **Mean Weight(kg)** | **SD** | **No.** | **Mean Weight(kg)** | **SD** |
| 3 | 6 | 11.1 | 1.24 | 5 | 11.14 | 0.95 |
| 4 | 19 | 12.98 | 2.26 | 9 | 13.54 | 1.95 |
| 5 | 10 | 13.75 | 1.16 | 12 | 14.67 | 2.04 |
| 6 | 6 | 15.45 | 0.84 | 7 | 15.66 | 1.27 |
| 7 | 10 | 17.13 | 1.53 | 9 | 16.21 | 1.31 |
| 8 | 11 | 18.08 | 2.42 | 8 | 17.58 | 1.37 |
| **Mean MUAC of the Boys and Girls** | | | | | | |
| **Age** | No. | Mean MUAC (cm) | SD | No. | Mean MUAC (cm) | SD |
| 3 | 6 | 14.17 | 0.69 | 5 | 14.38 | 0.76 |
| 4 | 19 | 14.62 | 0.97 | 9 | 14.6 | 0.72 |
| 5 | 10 | 14.68 | 0.52 | 12 | 14.64 | 0.68 |
| 6 | 6 | 15.03 | 44 | 7 | 15.09 | 0.42 |
| 7 | 10 | 15.84 | 0.95 | 9 | 15.41 | 0.73 |
| 8 | 11 | 16.08 | 0.81 | 8 | 15.74 | 0.62 |
| **Mean BMI of the Boys and Girls** | | | | | | |
| **Age** | **No.** | **Mean BMI(Kg/m$^2$)** | **SD** | **No.** | **Mean BMI(Kg/m$^2$)** | **SD** |
| 3 | 6 | 13.96 | 1.12 | 5 | 13.48 | 1.19 |
| 4 | 19 | 13.92 | 0.76 | 9 | 13.8 | 0.73 |
| 5 | 10 | 14.33 | 0.66 | 12 | 14.13 | 0.85 |
| 6 | 6 | 13.81 | 0.26 | 7 | 13.94 | 1.07 |
| 7 | 10 | 13.8 | 0.84 | 9 | 13.47 | 0.42 |
| 8 | 11 | 14.06 | 1.84 | 8 | 13.65 | 0.96 |

**Prevalence of Underweight, Stunting and Wasting in Children(3-5 years)**

The data on prevalence of underweight, stunting, and wasting among tribal children are presented in Table 2. Among the children (3-5 years), the prevalence of underweight,stunting, and wasting was59.03%, 60.656%, and 26.24%, respectively.Out of the 11 children in the age group of 3-4 years, 18.2 % were severely underweight, 45.5 % children were moderately underweight, 18.2% had moderately stunted growth, and 9.1% hadacute under-nutrition(wasting). The prevalence of totalunderweightamongchildren (48-60months)was58%, with48%moderatelyunderweightand10% severely underweight. Similarly,theoverallprevalenceofstuntingamongtribalchildren(48-60months)was70%, with 54%moderate and 16% severe stunting. The prevalence of wasting among these children was20 %(18%moderateacutemalnutrition(MAM)and2 %severeacutemalnutrition(SAM).Almost 6 in every 10 tribal children in *Mawasi*tribal childrenhave a lowheightfortheirage (stunted growth) and low weight for age(under weight).

**Table2:PrevalenceofUnderweight,StuntingandWastingamongchildren(3-5 years)**

| **Age** | | **Weight for Age** | | | |
|---|---|---|---|---|---|
| **In months** | **No. of children** | **Severe under malnutrition** WAZ < -3SD(%) | **Moderate under malnutrition** WAZ -3SD to -2SD (%) | **Total Under Nutrition** WAZ <-2SD(%) | **Normal** WAZ≥-2SD (%) |
| (36-47) | (36-47) | 11 | 18.2 | 45.5 | 63.7 |
| (48-60) | (48-60) | 50 | 10 | 48 | 58 |
| | | **61** | **11.48** | **47.55** | **59.03** |
| **Age** | | **Height for Age** | | | |
| **In months** | **No. of children** | **Severe under malnutrition** HAZ < -3SD (%) | **Moderate under malnutrition** HAZ -3SD to -2SD(%) | **Total Under Nutrition** HAZ <-2SD (%) | **Normal** HAZ≥-2SD (%) |
| (36-47) | 11 | 0 | 18.2 | 18.2 | 81.8 |
| (48-60) | 50 | 16 | 54 | 70 | 30 |
| | **61** | **13.11** | **47.54** | **60.65** | 39.35 |
| **Age** | | **Weight for Height for Age** | | | |
| **In years** | **No. of children** | **Severe under malnutrition** WHZ < -3SD(%) | **Moderate under malnutrition** WHZ -3SD to -2SD(%) | **Total Under Nutrition** WHZ<-2SD(%) | **Normal** WHZ≥ -2SD (%) |
| (36-47) | 11 | 9.1 | 45.5 | 54.7 | 45.3 |
| (48-60) | 50 | 2 | 18 | 20 | 80 |
| | **61** | **3.28** | **22.26** | **26.24** | 73.76 |
| **Age** | | **BMI for Age** | | | |
| **In years** | **No. of children** | **Severe under malnutrition** BAZ < -3SD(%) | **Moderate under malnutrition** BAZ -3SD to -2SD(%) | **Total Under Nutrition** BAZ <-2SD(%) | **Normal** BAZ≥ -2SD(%) |
| (36-47) | 11 | 9.1 | 45.5 | 54.7 | 45.3 |
| (48-60) | 50 | 0 | 10 | 10 | 90 |
| | **61** | **1.64** | **16.4** | **18.04** | 81.96 |

*Nutritional status based on WHO classification SD: Standard Deviation

**Prevalence of Underweight, Stunting and Thinness in Children(6-8 years)**

The nutrition status of children (6-8 years) was assessedusingBMI-for-age(BAZ)scores.BAZscoresweregeneratedfor51children(6-8years). Table3 presenttheprevalenceofthinness(BAZ<-2SD)andoverweight (BAZ >+1SD) among children (6-8 years). It was found that 20.13 % of thesechildrenwerethin(1.81%hadseverethinness,and18.02%hadmoderatethinness).Thepr evalenceof thinness among 6,7- and 8-yearchildren was 15.38%, 20.0% and 23.50 % respectively.

**Table3. Distribution (%) of children (5-8 years) according to theirnutritionalstatus**

| Age Group | | Weight for Age | | | | |
|---|---|---|---|---|---|---|
| **In years** | **In months** | **No. of children** | **Severe under malnutrition** WAZ < -3SD(%) | **Moderate under malnutrition** WAZ -3SD to -2SD(%) | **Total Under Nutrition** <-2SD(%) | **Normal** WAZ≥ -2SD(%) |
| 6years | 72 | 13 | 14.3 | 42.9 | 57.2 | 42.8 |
| 7 years | 84 | 19 | 10 | 75 | 85 | 15 |
| 8 years | 96 | 19 | 23.5 | 76.5 | 100 | 0 |
| | | **51** | **16.13** | **67.38** | **83.5** | 16.5 |
| **Age Group** | | **Height for Age** | | | | |
| **In years** | **In months** | **No. of children** | **Severe under malnutrition** HAZ < -3SD (%) | **Moderate under malnutrition** HAZ -3SD to -2SD(%) | **Under Nutrition** HAZ <-2SD (%) | **Normal** HAZ≥-2SD (%) |
| 6years | 72 | 13 | 0 | 28.6 | 28.6 | 71.4 |
| 7 years | 84 | 19 | 10 | 55 | 65 | 35 |
| 8 years | 96 | 19 | 23.5 | 64.7 | 88.2 | 11.8 |
| | | **51** | **12.48** | **51.88** | **64.36** | 35.64 |
| **Age Group** | | **BMI for Age** | | | | |
| **In years** | **In months** | **No. of children** | **Severe under malnutrition** BAZ < -3SD (%) | **Moderate under malnutrition** BAZ -3SD to -2SD(%) | **Under Nutrition** % < +1SD BAZ <-2SD (%) | **Normal** BAZ≥-2SD (%) |
| 6years | 72 | 13 | 7.1 | 7.1 | 15.38 | 84.62 |
| 7 years | 84 | 19 | 0 | 20 | 20 | 80 |
| 8 years | 96 | 19 | 0 | 23.5 | 23.5 | 76.5 |
| | | **51** | **1.81** | **18.02** | **20.13** | 79.87 |

* Nutritional status based on WHO classification SD: Standard Deviation

## Discussion

Based on the results of the study, it appears that the malnutrition in the form of underweight, and stunting along with different grades of malnutrition and nutritional deficiency signs was found to be widely prevalent among preschool children of the Mawasi tribe of Kanpur and Devlaha villages of Satna district of Madhya Pradesh. Among the children (3-5 years), the prevalence of underweightand stunting, wasting was 59.03% and 60.656%, respectively. The National Family Health Survey (NFHS -5, 2019-21) reported prevalence of underweight (33 %), stunting (35.7%) and wasting (19%) among preschool children of Tribal community in Madhya Pradesh. Almost 6 in every 10 tribal children in *Mawasi*tribal childrenhave a lowheightfortheirage (stunted growth) and low weight for age(underweight). Theoverallprevalenceofstuntingamongtribalchildren(4-5years)was70%,with54%moderate and 16% severe stunting. The prevalence of wasting among these children was 20%(18%moderateacutemalnutrition(MAM)and2 %severeacutemalnutrition(SAM). The present study also found that 83.50 % children in the age group of 6-8 years were underweight and 64.36 % children in this age group were having stunted growth. 20.13 % of

childrenwerethin(1.81%hadseverethinness,and18.02%hadmoderatethinness) in 6-8 years age.Theprevalenceof thinness among 6,7- and 8-yearchildren was 15.38%, 20.0% and 23.50 % respectively. The malnutrition burden among the Mawasi tribal children in these villages *is* higher thanthatofthe overall burdenof Madhya Pradesh. Mollahetal.(2021) also reported higher prevalence of underweight, thinness and stunting in tribal children aged 3-11 years of Paschimancahal area of West Bengal and similar results were seen in a study conducted forunder 16 children of tribal community of Odissa (Jeyakumar etal.2021). The prevalence of under nutrition among Mawasi children is reported much higher than of Juang tribe in Keonjhar District of Odishaand Sartang and Miji, lesser-known tribes of Arunachal Pradesh(Ashgar et al. 2021) (Kuiti, et al. 2022).To address malnutrition among children and adolescents, the quality of Mid-Day Meal(MDM) and Integrated Cchild Development Services(ICDS)supplement must be increased with the participation and monitoring of the PRIs, and otheragencies. The MDM should be able to provide all the essential macro and micro-nutrients tothechildren.Gram Panchayatssmaycreate nutritionalgardensforeachschool/ICDSAnganwadi withthehelpofMGNREGPworkers. A healthy diet protectsindividuals from all forms of malnutrition, and it protects people frominfectionsand arrange ofnon-communicablediseases.Ahealthydietcontainsmacronutrientsandmicronutrientsinappropriatepr oportions.Macronutrientsprovidetheenergyrequiredforthecellularprocessesfordailyfunctioning andmicronutrientsfacilitate normal growth, development, metabolism, and physiologic functioning**.**

## Conclusion

Based onthe result, it can be stated that there is a urgent need for lot of work to be done on improvement of nutritional and health status of Mawasi children. The hand in hand support of government and the local bodies for upliftment of tribal community can make a huge difference in current scenario.



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