Causes of Malnutrition in Scheduled Tribe Children of Dang District, Gujarat: Maternal Health and Child's Weight at the time of Birth

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Summary: Malnutrition is a global issue, and India is not exempt from it. According to the National Family Health Survey NFHS-5 (2019-20) report, nearly half of children aged 0 to 5 years in India suffer from malnutrition. This problem is particularly severe in Gujarat, and it is even more acute among tribal children. The tribal population represents an economically, socially, and educationally disadvantaged group. The government has implemented various measures to address malnutrition in tribal areas. Researchers have identified several causes of malnutrition, including traditional customs and practices within tribal societies, ecosystem changes, maternal age at marriage and childbirth, maternal education and occupation, dietary shifts, birth spacing, and family size.

In the present study, information about the causes of malnutrition was obtained from malnourished children and their mothers in the Dang district of Gujarat in 2015. By revisiting the same mothers and children in 2020, the researchers aimed to investigate whether the mother's health at the time of the child's birth contributes to the child's malnutrition among the various factors examined.

Key words: Gujarat, Dang District, Malnutrition, Government Schemes to prevent malnutrition, Scheduled Tribe Children and Mothers

Introduction: Malnutrition is a curse for any society, encompassing a broad spectrum of conditions. Generally, two types are prevalent: under-nutrition and over-nutrition.

According to a report by the World Health Organization (WHO, 2020), malnutrition stands as the leading cause of child mortality. Annually, 2.2 million babies succumb to developmental limitations during pregnancy, and another 1.4 million perish due to inadequate or absent breastfeeding at birth.

Malnutrition among women and children poses a grave concern in India. Despite numerous efforts to tackle this issue, there has been no significant change in the proportion of malnutrition, leading to an increasing burden of disease in the country. Malnutrition among Indian women and children not only results in anaemia or other diseases and deficiencies caused by protein, calorie, and vitamin insufficiencies but also impedes the physical and mental development of the child. Furthermore, malnutrition serves as a critical factor contributing to deaths from infections (Gogai, 2015).

The following method has been adopted to measure malnutrition:

1) STUNTING

2) WASTING

3) UNDERWEIGHT

Malnutrition Status in India: According to the National Family Health Survey (NFHS-3, 2005-06), the prevalence of malnutrition in India was 48%, which decreased to 38% according to NFHS-4 conducted in 2015-16 and 36% according to NFHS-5 conducted in 2019-20. These figures indicate that

measures to prevent malnutrition are insufficient. The proportion of malnourished children decreased by only 2% during the NFHS-4 and NFHS-5 periods. Underweight children decreased from 42.5% during NFHS-4 to 35.7% during NFHS-5, while the proportion of anaemic children decreased from 69.5% during NFHS-4 to 58.5% during NFHS-5. Additionally, there has been an improvement in the proportion of stunting among children aged 0 to 5 years in India over the last 15 years. Specifically, the proportion of stunting in 2005-06 was 52%, which decreased to 38.5% in 2015-16, indicating a 15% reduction. However, during 2019-20, the proportion of stunting increased by 0.5% instead of further decreasing.

Malnutrition Status in Gujarat: There is a 0.7% increase in the proportion of underweight children during 2019-20 compared to 2015-16, which remains a matter of concern. During the fifth round of NFHS, the prevalence of anaemia among children aged 0 to 5 years has also been reported to have increased compared to the previous round of NFHS-4. The proportion of anaemic children decreased from 74% during NFHS-3 in 2005-06 to 62% during NFHS-4, but then increased by 20% to 81% during NFHS-5. This situation is indeed very serious.

According to the NFHS-5 report, the incidence of malnutrition is higher in tribal society than in other societies. Specifically, there is a 43% prevalence of malnutrition among Scheduled Tribes (ST), 43% among Scheduled Castes (SC), 39% among Other Backward Classes (OBC), and 31% among the General category. A reduction of 1% has been recorded in the prevalence of malnutrition among tribal communities compared to the previous survey (NFHS-4).

According to the 2011 census, Scheduled Tribes in Gujarat constituted about 14.6% of the total population of the state, which is concentrated in 9 districts of the state: Dang (94.6%), Tapi (84.2%), Narmada (81.6%), Dahod (74.3%), Valsad (52.9%), Navsari (48.1%), and Bharuch (31.50%). The data on stunting, wasting, and underweight recorded among children aged 0 to 5 years during NFHS-4 and NFHS-5 in five districts of South Gujarat among the total Scheduled Tribe population of the state is shown below.

Table No.: 1: District-Wise Prevalence Rate and Differences of STUNTING, WASTING and UNDERWEIGHT for NFHS-4 and NFHS-5

DISTRICT	STUNTING			WASTING			UNDERWEIGHT		
	NFHS 4	NFHS 5	DIFF	NFHS 4	NFHS 5	DIFF	NFHS 4	NFHS 5	DIFF
	%	%	+/-	%	%	+/-	%	%	+/-
DANG	41.1	48.5	+0.4	43.0	43.2	+0.2	60.0	60.9	+0.9
TAPI	35.9	36.4	+0.5	35.8	37.5	+1.7	42.4	44.7	+2.3
NAVSARI	38.9	36.6	-2.3	26.8	29.0	+2.2	37.4	43.6	+6.2
VALSAD	43.3	51.9	+8.6	30.3	29.0	-1.3	41.9	48.0	+6.9
NARMADA	47.4	47.2	-0.2	35.8	23.0	-12.8	53.6	52.8	-0.8

From the information presented in the table above, it is evident that the proportion of stunted, wasted, and underweight children has increased instead of decreasing. Among these five districts, Dang district has the highest proportion of malnourished children.

Malnutrition is a global issue, and India is not exempt from it. According to the National Family Health Survey NFHS-5 (2019-20), nearly half of the children aged 0 to 5 years in India are malnourished. This

situation is also serious in Gujarat, particularly among tribal children, who face even more severe malnutrition. The tribal population is economically, socially, and educationally disadvantaged. The government has implemented various measures to combat malnutrition in tribal areas. According to researchers, the causes of malnutrition, as indicated in various studies, are directly linked to tribal society's traditional customs, practices, ecosystem changes, maternal age at marriage and childbirth, maternal education, occupation, dietary shifts, birth spacing, and number of children (Somani, 2013-14; Somani and Patel, 2013; Barker, 2001).

Efforts by central and state governments to address the problem of malnutrition:

1) Integrated Child Development Scheme (ICDS):-

   This scheme was initiated in 1975 across India, including Gujarat, by the Central Government to address the health issues of children and mothers. Currently, 14 lakh Anganwadis are operational in 6,49,481 villages across India as part of the scheme. Meanwhile, 52,137 Anganwadi Centers are operational in 18,500 villages in Gujarat.

   Anganwadi centers provide supplementary nutrition to pregnant and lactating mothers as well as children. Additionally, pregnant women receive free Dhanur vaccines and various vaccinations are administered to children from birth to five years of age. Health check-ups during pregnancy and specialist services, if required, are also provided under this scheme. Furthermore, Anganwadis offer nutrition, health, and childcare education to pregnant women and mothers to ensure the health and development of both mother and child.

   Moreover, to promote maternal and child health awareness, Anganwadis celebrate various days, encouraging mothers and children while informing them about health-related topics, vaccines, and other pertinent matters. These celebrations include Mamta Divas, Vatsalya Divas, Bal Divas, Kishori Divas, Nutrition Sabha, Annaprashan Divas.

Indian Government Schemes:

1) Janani Suraksha Yojana:
   Janani Suraksha Yojana was implemented in the year 2005 by the Ministry of Health and Family Welfare, Government of India. The scheme provides financial assistance of ₹ 6,000/- to all pregnant women above 19 years from below poverty line families towards purchase of nutritious food and transport cost for delivery.

2) Pradhan Mantri Matrivandana Yojana:
   The main objective of this scheme, launched by the Central Government in 2017, is to provide ₹ 6,000 in three installments to the mother giving birth to her first child. The installments are provided from the first month of conception to 6 months after delivery. This ensures that the mother does not have to work and can rest during both the pre-delivery and post-delivery periods. The assistance is provided in the form of cash payments.

In addition to the above-mentioned schemes of the Government of India, the state of Gujarat has also implemented special schemes to eradicate malnutrition among children aged 0 to 5 years and those attending primary school. These include Dudh Sanjeevani, Chiranjeevi, and Bal Amrit Yojanas.

1) Dudh Sanjeevani Yojana:
   This scheme was initiated by the state government in 2006-07. Under this scheme, every child and their mothers attending Anganwadi will receive 100 ml of milk for five days a week, respectively, and 200 ml for two days. Additionally, when children attend primary school, they are provided with 100 ml of milk per day for six days a week.

2) Chiranjeevi Yojana:

  The primary objective of this Yojana, launched in October 2006, is to prevent maternal deaths during pregnancy and childbirth, as well as child deaths during childbirth or within the first week of birth. Under this scheme, mothers receive the benefit of free delivery and check-ups in private hospitals.

3) Bal Amrit:

  The main objective of this Yojana, launched by the Gujarat government in 2016, is to provide health facilities to malnourished children. Under the scheme, a malnourished child receives necessary treatment at a Community Health Center or Primary Health Center for 14 days. Additionally, the parent accompanying the child is provided with free accommodation, meals, and a daily employment allowance of ₹ 100. This Yojana is specifically designed and implemented for the Dang district.

In the present study, information regarding the causes of malnutrition was obtained from malnourished children and their mothers in the Dang district of Gujarat in 2015. Researchers have attempted to revisit these same mothers and children in the year 2020 to determine changes in their malnutrition rates and to assess the effectiveness of efforts made by relating these changes to various government schemes aimed at eliminating malnutrition.

Research Methodology:

A comprehensive study of mothers with malnourished children was conducted in 2015 in three talukas: 1) Waghai, 2) Subir, and 3) Ahwa of the Dang district by students from Mahatma Gandhi Gram Abhyas Bhavan, Department of Veer Narmad South Gujarat University. A total of 5 students were selected for this preliminary survey. The primary objective of this survey was to investigate the causes of malnutrition in the Dang district. The details of the talukas, villages, and respondents covered in the survey are provided in the table below.

Table No.: 2: Taluka wise villages and number of respondents

Sr. No.	Name of Taluka	Number of Villages	Number of Respondents
1	Waghai	18	150
2	Subir	8	50
3	Ahwa	8	50
	Total	34	250

  The list of undernourished children, i.e., those in the red-grade category, registered in the Anganwadi was obtained by visiting the Anganwadis in the villages and selecting respondents from the residential areas of the students in the section and their surrounding areas. However, according to this information, only 2 or 3 children enrolled in the red-grade were found in the Anganwadi. When the other children in the Anganwadi were directly observed by the students of the department, they were also found to be malnourished upon measuring their MUAC. Hence, they were also considered as

respondents in the survey. A list of such mothers was obtained, and with the assistance of Anganwadi worker sisters, face-to-face interviews were conducted to gather detailed information about the malnourished children and their perspectives. A questionnaire was developed by the students to collect this information, with the present researcher also contributing to its creation.

Economic and social information, family background, agricultural details, personal hygiene practices, migration patterns, dietary habits, food consumption during pregnancy and delivery, and comprehensive data on malnourished children were collected. This included detailed information such as the mother's age at marriage, timing of first delivery, age, weight, height, BMI, spacing between children, birth weight of the child, and current weight, height, and BMI of the child. Additionally, data on the utilization of wild herbs, prenatal care facilities, and support provided to midwives by Anganwadi centers were gathered.

Students conducted face-to-face interviews with malnourished children and their mothers to obtain this information. Measurements of children's and mothers' weight and height were taken by the students themselves using measuring tools, with assistance from Anganwadi worker sisters. Birth weight data were sourced from Mamta cards, and for those without such records, weights were retrieved from Anganwadi growth charts. Additionally, strips for measuring mid-upper arm circumference (MUAC) were procured from Anganwadi worker sisters.

All the information mentioned above was gathered by the students of the department through personal interviews with malnourished children and their mothers. They visited each Anganwadi to collect this data. The information on malnourished children and their mothers was obtained by acquiring a list of malnourished children, with each student tasked to gather information from 50 respondents. This resulted in the completion of the survey with 50 respondents per student. Therefore, a total of 250 respondents from 27 villages were surveyed by the 5 students. Subsequently, all this data was entered into an Excel sheet and analysed using SPSS software.

A preliminary survey of mothers with malnourished children was conducted in 2015 by students of the department in 34 villages across three talukas of the Dang district. A total of 250 respondents were covered during this survey. These respondents were re-interviewed in 2020. The main objective of this research study was to determine the changes in their malnutrition rates over these five years and to correlate these changes with various government schemes aimed at eradicating malnutrition, assessing the effectiveness of such efforts. In addition to the information gathered in 2015, additional data was also collected as mentioned. The data collected includes the mother's education level, age, weight, height, and BMI at birth, maternal immunization during pregnancy, deworming vaccines for children, polls on malnourished children, and details of any new children born after 2015, such as the number of children, birth weight, age, weight, height, and BMI at the time of the 2020 visit. Additionally, information on mothers of malnourished children utilizing facilities from Anganwadis during adolescence, access to toilet facilities, changes in diet, and the views of older women on traditional foods, all collected earlier in 2015. This data was obtained through personal interviews conducted by the researcher with malnourished children and their mothers.

All the information mentioned above was collected and entered into an Excel sheet and analysed using SPSS software. The weight and height of the children and mothers were measured manually by the researcher using his own instruments (weighing fork, measuring tape). Additionally, Anthrosoftware was utilized to calculate the BMI of both children and mothers.

Health status of children
Analysis of Data:

Taking into account the classification of Chronic Energy Deficiency (CED) based on BMI as shown by the World Health Organization (WHO) in the year 1995, according to Table-3, the weight of the children included in the study and the categorization of malnourished children by the World Health Organization (WHO) are as follows:

Table No.: 3: Classification of CED

Sr. No.	Grade (CED)	BMI
1	3	Less than 16
2	2	Between 16 to 16.9
3	1	Between 17 to 18.4
4	Normal	Between 18.5 to 24.9
5	More	25 or more than that

Based on the information of age, weight and height of children, BMI (Body Mass Index) of children was calculated for malnourished children of the year 2015. The above data were classified based on the CED of (WHO, 1995) as shown in Table – 4

Table No.: 4: BMI of children in the study area

Sr. No.	GRADE	Children's BMI in the year 2015	Children's BMI in the year 2020	Changes
1	3	143 (57.2%)	218 (87.2%)	+ 75 (30%)
2	2	34 (13.6%)	25 (10%)	- 09 (3.6%)
3	1	40 (16%)	06 (2.4%)	- 34 (13.6%)
4	Normal	29 (11.6%)	01 (0.4%)	- 28 (11.2%)
5	More	04 (1.6%)	00	- 04 (1.6%)
	Total	250 (100%)	250 (100%)	

(Source-Field Information)

According to the information presented in the above table-4, in 2015, there were 57.2% of children in grade-3, and in 2020, this figure rose to 87.2%. This indicates a 30% increase in grade-3 over these five years. In 2015, 13.6% of children were in Grade-2, while in 2020, this decreased to 10%, indicating a 3.6% decline in Grade-2. Additionally, 16% of children were in Grade-1 in 2015, which decreased to 2.4% in 2020, resulting in a 13.6% decrease in the proportion of children in this category as well.

In the present study, 11.6% of children with a normal BMI were found in 2015, whereas only 0.4% were found in 2020, indicating a decrease of 11.2% in children with a normal BMI. This suggests a very concerning situation. Additionally, in 2015, there were 4 children with a BMI greater than 25, whereas in 2020, not a single child was observed with such a high BMI. Based on this information, decreases in each grade have been noted, particularly in Grade-3.

Hence, upon examining this data, it can be concluded that the rate of malnutrition has increased instead of decreasing.

All the aforementioned schemes have benefitted malnourished children and their mothers over the last five years. As a result, the BMI of mothers has improved in 2020 compared to 2015. However, as indicated in Table-4, instead of improving in the BMI of children compared to 2015, the severity of malnutrition in 2020 has worsened significantly.

Mother's health status:

Table No.: 5: Mother's BMI

Sr. No.	GRADE	Mother's BMI in the year 2015	Mother's BMI in the year 2020	Changes
1	3	10(4%)	9(3.6%)	-1(0.4%)
2	2	39(15.6%)	12(4.8%)	-27(10.8%)
3	1	120(48%)	84(33.6%)	-36(14.4%)
4	Normal	81(32.4%)	142(56.8%)	+61(24.4%)
5	More	00	03(1.2%)	+3(1.2%)
	Total	250(100%)	250(100%)	

(Source-Field Information)

According to the information presented in the above table-5, in 2015, there were (4%) mothers classified in grade-3, which decreased to (3.6%) in 2020, indicating a decrease of (0.4%). In Grade-2, there were (15.6%) mothers in 2015 and (4.8%) in 2020, resulting in a decrease of (10.8%) mothers in Grade-2. Grade-1 comprised (48%) of mothers in 2015 and (33.6%) in 2020, indicating a reduction of (14.4%) mothers in Grade-1. Meanwhile, the number of mothers classified as normal weight increased from (24.4%) in 2015 to (32.4%) in 2020, and (56.8%) in 2020. Additionally, there were no mothers with a BMI above 25 in 2015, whereas in 2020, (1.2%) were observed.

This data indicates an improvement in the mother's BMI. Various reasons may be responsible for this condition, which the researcher has not investigated.

According to the data presented in Table No: 4, instead of improving the child's BMI, the condition appears to worsen.

Examining the reasons responsible for the aforementioned undernourishment situation, according to the WHO report, a child with a birth weight of 2.5 to 3.25 kg is considered healthy, while a child weighing less than 2.5 kg is considered malnourished

To validate this data, it was found that 85.2% of the total malnourished children covered in the present study were underweight. The details of which are shown in Table No: 6.

Table No: 6: Birth Weight of Child

Sr. No.	Description	Figures	Percentage
1	Normal	37	14.8%
2	Less	213	85.2%
	Total	250	100%

(Source-Field Information)

In his research paper, (V. J. Somani, 2015) highlighted the various causes of malnutrition in the Dang district. Factors such as social stereotypes, superstitions, inadequate utilization of health facilities, changing food habits, mother's education, lack of health facilities, intra-uterine and post-natal migration, etc., contribute to child malnutrition.

Furthermore, (Pawar Kalpana and V. J. Somani, 2020) in their paper demonstrated that 78.2% of the mothers were married before the age of 18, among whom 50.2% became mothers within the first year of marriage, and 95.6% were employed during pregnancy. Mothers who migrated were also found to have a lower BMI at birth. Detailed information is provided in Table No. 7 below.

Table No.:- 7: Cross table showing birth weight of malnourished child and mother's BMI at birth

Sr. No.	Child's weight at birth	Percentage	Mother's BMI		
			GRADE-Normal	GRADE-1	GRADE-2
1	Normal	37 (14.80%)	26 (10.40%)	10 (4.00%)	3 (1.20%)
2	Less	213 (85.20%)	29 (11.60%)	111 (44.40%)	71 (28.40%)
	Total	250 (100%)	55 (220%)	121 (48.40%)	74 (29.60%)

(Source-Field Information)

Based on the information presented in the table above, does the mother's BMI affect the birth weight of malnourished children? Among the total number of children, 37 (14.80%) were found to have normal weight. Out of these normal-weight children, 26 (10.40%) had mothers with a normal BMI at birth, while 4.00% of mothers were classified in grade-1 and 1.20% in grade-2.

This indicates that 14.80% of the total children had a normal BMI, and their mothers' BMI at birth was also found to be normal.

While 85.20% of the children who were underweight at birth were identified, among whom 72.80% of their mothers had a BMI of less than 18.5 at the time of birth. Therefore, it can be concluded that the mother's BMI directly influences the child's birth weight. Thus, if the mother's BMI is low at the time of the child's birth, the likelihood of her future child being malnourished increases. This finding aligns with previous research findings.

All the respondent mothers and children included in the research receive supplementary nutrition for pregnant women, midwives, and children through various central government schemes like Anganwadi. Additionally, Dhanur vaccine is administered to pregnant women, and various vaccines are provided free of cost to children from birth to five years of age. Periodic health check-ups for pregnant women, along with specialist services if necessary, are also offered under this scheme. Furthermore, nutrition and health education, as well as childcare education, are provided to pregnant women and mothers through Anganwadis. These measures ensure that the health of both mother and child is safeguarded, promoting their healthy development. The state government schemes such as Dudh Sanjeevani, Chiranjeevi, and Bal Amrit Yojana further support pregnant mothers during pregnancy. The children of such mothers also benefit from various schemes available to them.

Conclusion: Based on all the information provided above, it can be concluded that if a child's birth weight is low, despite receiving adequate nutritional food and care, they may still be unable to overcome malnutrition. This suggests that factors beyond nutritional supplements may also contribute to malnutrition. Therefore, researchers believe that by paying more attention to the mother's condition before childbirth, in addition to providing supplementary nutritional diets, the prevalence of malnutrition can be reduced more effectively.

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