Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/4mqqt020

AN ASSESSMENT OF THE NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN OF TEA GARDEN WORKERS OF SONITPUR DISTRICT, ASSAM, INDIA

Dr. Alok Kumar Das[1*], Dr. Rupali Baruah[2], Dr. Shashanka Shekhar Chakraborty[3], Dr. Chandi Ram Kalita[4]

[1] *Post Graduate Trainee, Department of Community Medicine, Tezpur Medical College & Hospital, Assam, India
[2] Professor & Head, Department of Community Medicine, Tezpur Medical College & Hospital, Assam, India
[3]Associate Professor, Department of Community Medicine, Tezpur Medical College & Hospital, Assam, India
[4]Statistician-cum-Lecturer, Department of Community Medicine, Tezpur Medical College & Hospital, Assam, India

***Corresponding Author:** Dr. Alok Kumar Das
*Post Graduate Trainee, Department of Community Medicine, Tezpur Medical College & Hospital, Assam, India

ABSTRACT

Background: Malnutrition is the major cause of morbidity and mortality among under-five children especially in the developing countries. Though the tea tribe peoples gives significant contribution in Indian economy but still they are the most neglected communities in our society due to which malnutrition is highly prevalent in their children.

Materials and Methods: A community based cross-sectional study conducted among 400 under-five children of Tea Garden workers of Sonitpur District, Assam, the children were selected by using multistage random sampling. A pre-planned, pre-tested, semi-structured interview schedule was used to gather data. Anthropometric measurements were recorded. Data analysis were performed using IBM SPSS (v30.0.0), applying the Chi-square test for association, with statistical significance at $p<0.05$.

Results: Among 400 participants 52.5% were females and 47.5% were males, among which maximum of children belongs to 0-15 months of age group. 38.8% of children were born underweight, 47% were partially immunized, and 9.3% of mothers did not exclusively breastfeed. Significant characteristics related with underweight were birth weight ($p<0.001$), immunization status ($p=0.003$), exclusive breastfeeding ($p=0.008$), and complementary feeding ($p=0.021$). Stunting was associated with birth weight, mother's age, initiation of breastfeeding, and immunization status ($p < 0.05$). Religion ($p=0.022$), preterm birth, place of delivery, exclusive breastfeeding, initiation of breastfeeding, complementary feeding, and MUAC all had a significant relationship with wasting.

Conclusion: Malnutrition is still a significant public health problem among under- five children of tea garden workers with low immunization status, exclusive breastfeeding and low birth weight. Our study findings recommend for the awareness building among the tea garden workers in regard to boost maternal child nutrition initiative, encourage IEC on child care and feeding. Educate mothers on managing diarrhoea and appropriate feeding techniques.

INTRODUCTION

Malnutrition is a serious problem worldwide, particularly in underdeveloped nations. Among developing countries India has a considerable case of nutritional deficient children which lead to high number of morbidity and mortality. Nowadays a number of the children in India suffer from malnutrition which may be due to some nutritional or mineral deficiencies. This may lead to stunting, wasting or underweight or overweight. Poverty, economic recession, overcrowding are the main causes which makes the under-five more vulnerable to malnutrition. Globally, in 2024, 150.2 million of all the under-five children in the world were stunted which is about 23.3% and 42.8 million under-five children were affected by wasting[1]. According to Global Hunger Index, in 2024. India ranks 105th out of 127 countries in which India scored only 27.3, which means India's hunger level is in serious condition and in alarming condition. Here Global Hunger Index is based on four indicators namely undernourished population, stunted children, wasted children and under five mortality which is 13.7%, 35.5%, 18.7% and 2.9% respectively[2]. However, the prevalence of stunting, wasting, and underweight among Indian children under five was 35.5%, 19.3%, and 32.1%, respectively, in NFHS-5 (2019–21).[3]. Government of India has launched many programs to fight against this issue. But due to poor assessment and poor utilization of services by lower socioeconomic class of population lead to all these programs become ineffective. Among the lower socioeconomic class people many of them belong to Adivasi or Tea Tribe population.

Sonitpur is known for its rich cultural heritage and beautiful natural landscape which is also consist of beautiful Tea gardens where Adivasi or Tea tribe people lives. Though there is a significant contribution in Indian economy but Tea tribe communities are historically neglected and marginalized where chances of malnutrition is higher. According to NFHS-5 Assam, the prevalence of stunting, wasting and underweight in under-five children were 35.3%, 21.7% and 32.8% respectively[4], while in Sonitpur the prevalence of stunting, wasting and underweight among under-five children were 36.7%, 13.1% and 21.9% respectively[5] while no such details was available for under-five children of tea garden workers. Hence the study is planned to determine prevalence and associated factors for nutritional status of the under-five children of this region.

METHODOLOGY

A community based cross sectional study was conducted in the tea garden areas of Sonitpur district, Assam after getting clearance from institutional ethical committee. The study was conducted from September 2023 to August 2024.

Inclusion Criteria

Children aged 0 to 59 months who were permanently residing in the selected Tea Garden areas of Sonitpur District.

Exclusion Criteria

The mother or caregiver refused to give informed consent and children of age >59 months and also children suffering from any congenital anomaly or genetic disorder.

Sample size was calculated by taking the prevalence of underweight as 32.8%, according to NFHS-5 (Assam) and with confidence interval of 95%.

Calculated by formula $N=4pq/L^{2,}$ where, N= Sample Size, p=Prevalence 32.8 (According to NFHS-5), q= (1- Prevalence) = 67.2 and L= allowable error = 15% of p = 4.92. Hence calculated sample size (N)= 364.

Accounting for non-response (10%), adjusted sample size was rounded up to 400.

Here, to get a sample of 400 under-five children multistage random sampling was used.

Firstly, Block PHC of Sonitpur District were selected by random sampling method. After that each of the selected Block PHC's the list of tea gardens was obtained and was selected by simple random sampling and the list of the households were obtained by the records of the local ASHA. Each of the household was selected by systematic sampling method in which 400 children were selected from

each of the Tea gardens by probability proportional method. Data was collected by using a pre designed and pre tested semi structured interview schedule after taking informed consent/assent.
Data analysis was done by using the IBM- Statistical package for social sciences (IBM-SPSS) and tabulated in MS-Excel 2021. Standard statistical test Chi-square test was used for categorical variable. Statistical variable was done at a 95% confidence interval, i.e., $p<0.05$.
Operational Definition
Height: Height was measured with the help of measuring tape for those children who can stand and it is measured in centimetres[6].
Length: Length is measured with the help of infantometer for those children who could not stand. The child was laid supine with the head touching the vertical rigid board. Legs was fully extended by pressing the knees on the board so that heel should touch the other end of the vertical board of infantometer[6].
Weight: Weight is measured with the help of spring scale weighing machine[6].
Mid Upper Arm Circumference (MUAC): MUAC measurement is usually performed in the left mid upper arm for the children of age group 06 months to five years of age. The mid-point is determined by measuring the midway between acromion process and the olecranon[6].

RESULTS

Table 1. Demographic, socioeconomic and care practices of under-five children

Characteristics	Categories	Frequency	Percent (%)
Sex	Female	210	52.5
	Male	190	47.5
Age in months	0 to 15	217	54.3
	16 to 30	92	23
	31 to 45	49	12.3
	46 to 60	42	10.5
Mother's Age in Years	≤30	365	91.25
	>30	35	8.75
Mother's Education	Graduate or Post Graduate	1	0.3
	High school certificate	18	4.5
	Middle school completion	168	42
	Primary school or literate	84	21
	Illiterate	129	32.3
Religion	Hindu	307	76.8
	Muslim	3	0.8
	Christian	90	22.5
Total Family Size	≥ 5	210	52.5
	< 5	190	47.5

Family Type	Nuclear	181	45.3
	Joint	219	54.8
Socioeconomic Status	Middle Class	41	10.3
	Lower Middle Class	218	54.5
	Lower Class	141	35.3
Birth Weight	≤2.5	155	38.8
	>2.5	245	61.3
Duration of pregnancy	Term	372	93
	Pre Term	21	5.3
	Post Term	7	1.8
History of Sickness	Present	352	88
	Absent	48	12
Immunization Status	Partially Immunized	188	47
	Fully Immunized	162	40.5
	Completely Immunized	50	12.5
Exclusive Breastfeeding	Yes	363	90.8
	No	37	9.3

In this study, we conducted an analysis of the children who took part in the research. Among the 400 participants, a significant majority were females, numbering 210, which accounts for 52.2% of the total, while males comprised 190 participants, representing 47.5%. Majority of the children were belonged to age group 0-15 months of age which comprise of 54.3% of the study population. Most of the mothers are below ≤30 years of age group which is 91.25% according to the survey. About 42% of the mothers completed their middle school and 32.3% are illiterate. 76.8% of the respondent are Hindu. A high proportion of respondent, 52.5% reported having family size of five or more members and about 47.5% of the families have fewer than five family members. A large respondent 43.5% live in nuclear family and approximately 54.5% belongs to lower middle-class family. In terms of birth weight, 61.3% of the children were born weighing more than 2.5 kg, which is considered a healthy weight at birth. However, a large proportion (38.8%) were born with a birth weight of ≤2.5 kg, indicating low birth weight. Most pregnancies (93%) were full-term; 5.3% were preterm; 1.8% were post-term. About 352 which is 88% children of the population had history of sickness since last 1 year. A bigger percentage (40.5%) were fully immunized, which means they received all basic immunizations but 47% of the children were partially immunized. In this study a large majority of mothers (363, 90.8%) practiced exclusive breastfeeding. However, 37 (9.3%) mothers did not exclusively breastfeed.

Table 2: Factors associated with underweight among under-five children

Characteristics	Categories	Underweight			P value
		Yes	No	Total	
		n (%)	n (%)	n=400	
Mother Education	Illiterate	59 (45.7)	70 (54.3)	129	0.267
	Primary School/ Literate	41 (48.8)	43 (51.2)	84	
	Middle School Completion	63 (37.5)	105 (62.5)	168	
	High School Certificate	6 (33.3)	12 (66.7)	18	
	Graduate or Post Graduate	0 (0)	1 (100)	1	
Socioeconomic Status	Middle Class	19 (46.3)	22 (53.7)	41	0.683
	Lower Middle Class	88 40.4	130 (59.6)	218	
	Lower Class	62 (44)	79 (56)	141	
Mother Occupation	Housewife	92 (39.5)	141 (60.5)	233	0.218
	Tea garden worker	77 (46.1)	90 (53.9)	167	
Birth Weight	≤2.5	75 (48.4)	80 (51.6)	155	0.049
	>2.5	94 (38.4)	151 (61.6)	245	
Immunization Status	Partially Immunized	95 (50.5)	93 (49.5)	188	0.005
	Fully Immunized	54 (33.3)	108 (66.7)	162	
	Completely Immunized	20 (40)	30 (60)	50	
Exclusive Breast feeding	Yes	144 (39.7)	219 (60.3)	363	0.001
	No	25 (67.6)	12 (32.4)	37	
Complementary feeding	Yes	33 (33)	67 (67)	100	0.035
	No	136 (45.3)	164 (54.7)	300	

Table 3: Factors associated with stunting among under-five children

Characteristics	Categories	Stunting			P value
		Yes	No	Total	
		n (%)	n (%)		
Religion	Hindu	86(76.8)	221(76.7)	307(76.8)	0.303
	Muslim	2(1.80)	1(0.03)	3(0.80)	
	Christian	24(21.4)	66(22.9)	90(22.5)	
Birth Weight	≥2.5	78 (24.1)	245 (75.9)	323	<.001
	<2.5	34 (44.2)	43 (55.8)	77	
Mother's Age in Categories	15-20	41(33.1)	83 (66.9)	124	0.017
	21-25	44 (31)	98 (69)	142	
	26-30	23 (23.2)	76 (76.8)	99	
	31-35	2 (6.7)	28 (93.3)	30	
	36-40	2 (40)	3 (60)	5	
Exclusive Breast feeding	Yes	95 (26.2)	268 (73.8)	363	0.013
	No	17(45.9)	20 (54.1)	37	
Initiation of Breastfeeding	Within 1 hour	58 (23.1)	193 (76.9)	251	0.016
	Between 1 to 24 hour	27 (34.6)	51 (65.4)	78	
	After 24 hour	27 (38)	44 (62)	71	
Immunization status	Partially Immunized	67 (35.6)	121 (64.4)	188	<.001
	Fully Immunized	29 (17.9)	133 (82.1)	162	
	Completely Immunized	16 (32)	34 (68)	50	
Water Source	Shared	64(57.1)	153(53.1)	217	0.503
	Tap Water	48(42.9)	135(46.9)	183	

Table 4: Factors associated with wasting among under-five children

Characteristics	Categories	Wasting			P value
		Yes	No	Total	
		n (%)	n (%)		
Child's Gender:	Male	64(48.9)	126(46.8)	190	0.749
	Female	67(51.1)	143(53.2)	210	
Religion:	Hindu	104(33.9)	203(66.1)	307	0.022
	Muslim	3 (100)	0 (0)	3	
	Christian	24 (26.7)	66 (73.3)	90	
Birth Weight	≤2.5	50(38.2)	105(39)	155	0.913
	>2.5	81(61.8)	164(61)	245	
Duration of Pregnancy	Term	116(31.2)	256(68.8)	372	0.033
	Pre Term	12 (57.1)	9 (42.9)	21	
	Post Term	3 (42.9)	4 (57.1)	7	
Place of delivery	Home	42 (42)	58 (58)	100	0.027
	Hospital	89 (29.7)	211(70.3)	300	
Exclusive Breast feeding	Yes	110(30.3)	253(69.7)	363	0.002
	No	21 (56.8)	16 (43.2)	37	
Initiation of Breastfeeding	Within 1 hour	69 (27.5)	182(72.5)	251	0.014
	Between 1 to 24 hour	33 (42.3)	45 (57.7)	78	
	After 24 hour	29 (40.8)	42 (59.2)	71	
Complementary feeding	Yes	24 (27)	76 (76)	100	0.036
	No	107(35.7)	193(64.3)	300	
MUAC	≤12.5	67 (42.1)	92 (57.9)	159	0.002
	>12.5	64 (26.6)	177(73.4)	241	

Table 2 shows that the factors associated with underweight among under-five children in which mother's education, socioeconomic status and mother's occupation are not significantly associated with the undernutrition of under-five children but the birth weight of the children, immunization status, exclusive breast feeding and complementary feeding are significantly associated with the underweight of the under-five children in which $p<0.05$.

From the table 3, we analysed that the factors such as birthweight, mother's age in categories, exclusive breast feeding, initiation of breast feeding, immunization status are significantly associated with stunting ($p<0.05$) but religion and water source are not significantly associated with the stunting. Each of the variables shows a significant correlation with wasting status($p<0.05$). Except child's gender and birth weight (p value > 0.05). Hindus (33.9%) have a greater prevalence than Christians (26.7%) but despite the small sample size (n = 3), there is a significant correlation between religion (P = 0.022) and wasting status among Muslims. Preterm births (57.1%); term births (31.2%); and place of delivery (P = 0.027, which is significant). As well as exclusive breast feeding (p=0.002), Initiation of breast-feeding (p=0.014), complementary feeding (p= 0.036) and MUAC (P= 0.002) also shows significant association with wasting.

DISCUSSION

The present study was conducted in a tea garden area involving 400 under-five children. From these research participants, we attempted to obtain the data deemed necessary to determine the prevalence of malnutrition in children under five who work in tea gardens and the impact of maternal, environmental, and demographic characteristics. The current study determines the existing risk and causes of malnutrition, as well as the related variables with child malnutrition in terms of underweight, stunting, and wasting among these 400 under-five children from tea garden areas.

Our study screened 400 children, aged 0 to 59 months, for malnutrition and associated risk factors, examining 52.5% females and 47.5% males, and the age range 0-15 months had the highest children count and 10% fall between the ages of 46 to 60 months as described in **Table 1.** Similar studies

shown in a study by Preeti SA et al. (2023)[7] conducted in the rural area of Haldwani were the number of female and male malnourished children were 53.2% and 46.8%, respectively[7] and the most participants 26.7% are between the ages of 12 and 23 months; the fewest 15.8% are between the the ages of 24 to 35 months[7]. Islam et al. (2013)[8], in their study, reported that out of 500 children, 58.8% were female and 41.2% were male[8]. Asif M et. al. (2019) performed in the tea gardens of Jorhat District, Assam, which revealed somewhat similar results[9].

Mother's educational background has divided into many parts in which 32.3% of mother's were illiterate and most of them 42.2% had completed middle school. Comparable studies by Tanu Midha et.al. carried out in the slums of Kannauj District a 0% rate of graduate/postgraduate education and the highest proportion of illiterate mothers (68.4%) in the research population[10].

While evaluating the religion, we discovered that Hindus are predominated and most of them 54.8% are belong to joint families. Ronghangpi P. et. al. did similar research with 85.9% of the study participants are Hindu and 64% of the participants were from mixed families. Most of the participants in the study fall into the lower middle class and 10.3% belongs to middle class family. Studies revealed similar results in Saha A et. al. (2017) most of the participants were from lower middle class households (65.38%)[12]. With 47% being partially immunized and only 12.5% fully immunized, similar study conducted by Gayakawad et. al. (2015)[13] with 15.6% partially immunized[13]. Table 2, studies show the link between factors associated with underweight in which maternal education (p= 0.267) and occupation (p=0.218) is not significantly associated with the malnutrition of the children as socioeconomic status of the family. Similar study conducted by Renuka Manjunath et.al. (2014) found that there is no significant association of moth's education and occupation with malnutrition[14].

Table 2, also shows the significant association between the birth weight, immunization status, exclusive breastfeeding and complementary feeding with malnutrition. Similar study conducted by Ronghangpi et.al. (2023) found significant association between immunization status and malnutrition[11]. Preeti et. al (2023) noted significant association between the exclusive breastfeeding and complementary feeding with malnutrition[7].

From the Table 3, the factors associated with the stunting such as birth weight ($p<0.001$), Mother's age in categories ($p=0.017$), exclusive breastfeeding ($p=0.013$), Initiation of breastfeeding ($p=0.016$), Immunization status ($p<0.001$) are significantly associated with the stunting of under-five children. Similar studies were conducted by Preeti et. al. (2023) with the birth weight of the children, maternal age immunization which is significantly associated with stunting, maternal weight significantly associated in a study conducted by Bagewadi et. al. (2023)[15]. In the study conducted by Islam et.al. (2013)[8] and Ronghangpi et. al. (2023)[11] shows the significant relationship between exclusive breastfeeding with stunting.

From Table 3, the wasting among under-five children was significantly associated with religion ($p = 0.022$), duration of pregnancy ($p = 0.033$), place of delivery ($p = 0.027$), exclusive breastfeeding ($p = 0.002$), initiation of breastfeeding ($p = 0.014$), complementary feeding, and MUAC ($p < 0.05$). Birth weight and gender showed no significant association. Similar findings were reported by Bagewadi et al. (2023)[15], Preeti et al. (2023)[7], and Midha et al. (2018)[10] for most factors, including religion, pregnancy duration, delivery site, and feeding practices. However, Ronghangpi et al. (2023)[11] reported contrasting results for religion and MUAC.

SUMMARY

The study assessed malnutrition among under-five children of tea garden workers of Sonitpur District, Assam, involving 400 children (52.2%). The associated factors include exclusive breastfeeding, complementary feeding, immunization status, birth weight.

Most children (54.3%) were aged 0-15 months with 88% children were history of sickness in last 01 years and 47% of the children were partially immunized. Most household from joint family.

RECOMMENDATIONS:

Boost maternal-child nutrition initiatives, encourage IEC on child care and feeding, and enhance access to water, sanitation, and vaccinations. Educate mothers on managing diarrhoea and appropriate feeding techniques, and train health professionals to conduct routine growth monitoring. To fill in the remaining gaps, more research is required.

REFERENCE

1. UNICEF, WHO, World Bank. Joint child malnutrition estimates [Internet]. Geneva: World Health Organization; 2022 [cited 2025 May 15]. Available from: https://www.who.int/data/gho/data/themes/topics/joint-child-malnutrition-estimates-unicef-who-wb
2. Global Hunger Index. India: Global Hunger Index (GHI) - peer-reviewed annual publication [Internet]. Bonn: Welthungerhilfe and Concern Worldwide; 2024 [cited 2025 May 15]. Available from: https://www.globalhungerindex.org/india.html
3. Ministry of Health and Family Welfare (MoHFW), Government of India. National Family Health Survey (NFHS-5), Phase II, 2019–21 [Internet]. New Delhi: MoHFW; 2021 [cited 2025 May 15]. Available from: https://mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf
4. National Health Mission, Assam. Fact Sheet Assam [Internet]. Guwahati: NHM Assam; [cited 2025 May 16]. Available from: https://nhm.assam.gov.in/sites/default/files/swf_utility_folder/departments/nhm_lipl_in_oid_6/menu/document/factsheet_as.pdf
5. National Health Mission, Assam. Sonitpur: District Fact Sheet [Internet]. Guwahati: NHM Assam; [cited 2025 May 16]. Available from: https://nhm.assam.gov.in/sites/default/files/swf_utility_folder/departments/nhm_lipl_in_oid_6/menu/document/sonitpur_1.pdf
6. World Health Organization. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. World Health Organ. Tech. Rep. Ser. 1995; 854:1-452.
7. Preeti SA, Gupta R, Kanubhai TH. Assessment of Prevalence of Malnutrition among Under-Five Children in Rural Area of Haldwani. www. ijphrd. com. 2023;14(3):174.
8. Islam S, Mahanta TG, Sarma R, Hiranya S. Nutritional status of under 5 children belonging to tribal population living in riverine (Char) areas of Dibrugarh district, Assam. Indian Journal of Community Medicine. 2014 Jul 1;39(3):169-74.
9. Asif M, Das BR, Baruah A. Prevalence of diarrhoea and child care practices among under-five children in tea gardens of Jorhat district, Assam. International Journal of Community Medicine and Public Health. 2019 Aug;6(8):3477.
10. Midha T, Nigam S, Martolia DS, Kaur S. Prevalence and determinants of protein energy malnutrition among under five children in slums of Kannauj district. Indian Journal of Forensic and Community Medicine. 2018 Oct;5(4):218-22.
11. Ronghangpi P, Mahanta TG, Boruah M. Determinants of Severe Acute Malnutrition in under-five children in Dibrugarh District, Assam. Indian Journal of Community Health. 2023 Dec 31;35(4):471-80.
12. Saha A, Bhattacharjya H. Feeding practice of infant and young children and their nutritional status among tea worker community of West Tripura district, India: an observational study. International Journal of Community Medicine and Public Health. 2018 Feb;5(2):627.
13. Gayakawad V, Shankar G. Under nutrition And Its Determinants among Children between 1–5 years of age residing In an Urban Slum of Bagalkot city, Karnataka State. Indian Journal of Forensic and Community Medicine. 2017;4(4):245-9.
14. Manjunath R, Kulkarni P, Begum K, MR G. Malnutrition among under-five children of Kadukuruba tribe: Need to reach the unreached. Journal of clinical and diagnostic research: JCDR. 2014 Jul 20;8(7):JC01.

15. Bagewadi V, Sumita LA, Kharde S. Determinants of malnutrition among under five children: A cross-sectional study in urban Belgaum, India. BLDE University Journal of Health Sciences. 2023 Jan 1;8(1):106-12.