

Factors Associated with Diarrhoeal Morbidity among Under-Five Children in Tea Gardens of Jorhat District, Assam

¹Mohd Asif , ¹Anuja Baruah, ^{1*}Bishnu Ram Das

Department of Community Medicine, Jorhat Medical College, Jorhat, Assam, India

Corresponding Author: Prof (Dr.) Bishnu Ram Das, Department of Community Medicine, Jorhat Medical College, Jorhat-785001, Assam, India

Citation this Article: Mohd Asif , Anuja Baruah, Bishnu Ram Das, “Factors Associated with Diarrhoeal Morbidity among Under-Five Children in Tea Gardens of Jorhat District, Assam”, IJMSIR- March - 2020, Vol – 5, Issue -2, P. No. 47 – 57.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: Diarrhoea is a major killer among under-five children. Poor environmental sanitation and lack of safe drinking water result into high rate of infections.

Objective: To assess the determinants associated with diarrhoeal morbidity among under five children of tea garden community

Methods: A Community-based cross-sectional study was conducted among under-five children of tea gardens in Jorhat, Assam between July 2017 to June 2018.

Result: Out of 315 participants 24.1% belonged to the 12-24 months age group, 55.2% males, 58.7% belonged to 1st birth order, 62.2% from nuclear families and 51.7% from lower middle class. The two weeks prevalence of under five diarrhoea in tea garden children was 26.4%. Majority of the houses (81%) were Kutchha, overcrowded (84.4%). Source of drinking water was tap (80.3%) and community water supply (63.2%). Household 92.7% used separate container for transport & storage of water. 69.8% practiced boiling as a method of water purification. 76.2% households had

sanitary latrine, 53% disposed excreta of children in garbage pit, and 98.1% used soap & water for hand washing. Diarrhoea was observed to be more prevalent in overcrowded houses (38.8%), subjects using pond water (62.5%) for drinking purpose, those who used vessels without handle (50%), those who used boiling and then straining by cloth (66.7%) for purification of water, or disposed the excreta of children by washing into drain (35.7%), or those who used only water for hand washing (33.3%).

Conclusion: The study has revealed that overcrowding, inadequate provision of safe drinking water, lack of sanitary disposal of excreta, poor hand hygiene were the potential determinants of childhood diarrhoea in tea garden community. Therefore, a comprehensive diarrhoeal disease control strategy is recommended to alleviate the problem.

Keywords: Diarrhoea, Associated Factors, Tea Garden Community, Under Five Children, Morbidity

Introduction

Diarrhoea is defined as having three or more loose or liquid stools per day or more frequent passage than is

normal for the individual.¹The period below 5 years among the children is the most crucial period. Any infection during this period will affect the growth and development of child, as maximum growth and development occur in this period. Among the infectious diseases, acute respiratory infections (ARI) and acute diarrhoeal disease (ADD) are leading cause for childhood mortality and morbidity.² Childhood diarrhoeal diseases continue to be a major killer among under-five children in many states, contributing to 10 percent of under-five deaths in our country. Diarrhoeal deaths are usually clustered in summer and monsoon months and the worst affected are children from poor socio-economic stratum. Poor environmental sanitation and lack of safe drinking water result into high rate of infections and protein energy malnutrition.³ It is caused by certain bacteria, viruses or parasites present in fecal matter which may be spread through water, food, hands, eating and drinking utensils, flies, and dirt under fingernails.⁴ Factors such as poor availability, affordability and distance between water source and home may lead households to depend on less safe sources and reduce the volume of water used for hygiene purposes, resulting in water related infections.⁵ The tea garden population is a special entity of Assam and a study of their environmental conditions with reference to diarrhoea to identify the gaps in the practices would be crucial. Therefore it was decided to carry out a research study with the objective to determine the factors associated with diarrhoeal morbidity among under five children in tea gardens of Jorhat district, Assam.

Material and Methods

The present study is a community based cross sectional study conducted among the under-five children of selected tea gardens of Jorhat district from July 2017 to

June 2018. According to a study in tea garden of Darjeeling, West Bengal⁵, the prevalence of diarrhoea among under five children was found to be 26%. So taking prevalence 26% and with 5% allowable error the sample size calculated to be 296 rounding of 300. Assuming 5% non response sample size was calculated to be equal to $300 + 15 = 315$.

A Multi-Stage Random Sampling was used in the study to select the required number of samples from the study universe. In the first stage out of the seven Block PHC of Jorhat district, three Block PHCs was selected by Simple Random Sampling (SRS). The Block PHCs selected were Titabor, Kakojan and Baghchung.

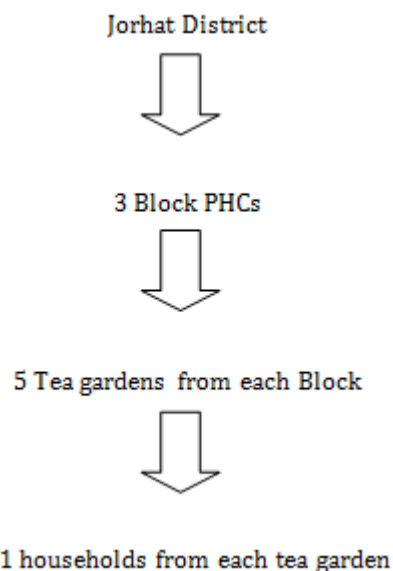


Figure 1: Flowchart of Multistage Random Sampling

In the second stage, in each of the selected Block PHCs, the list of tea gardens was obtained and five tea gardens were selected by Simple Random Sampling. In the third stage, in each of the selected tea gardens, the list of the households was obtained from the records of the Accredited Social Health Activist (ASHA). Then twenty one households were selected by Systematic Random Sampling technique from the list of each of the selected tea garden. The first household was selected randomly. Subsequently every 5th household

was visited till the twenty one household were completed. In the selected household it was inquired if there was any under-five child. If no under-five child was found in that household, then the adjacent household was visited. A total of 315 under-five children were thus obtained from the fifteen selected tea gardens.

The under-five child in the selected household was visited and the pre-designed pre-tested semi-structured Interview Schedule administered after taking understood written consent. Interview was conducted with the mother. In the absence of the mother, the father or any other caregiver who takes care of the child was interviewed. If any selected study participant or his/her caregiver was found absent on the day of data collection, the household was revisited up to a total of three visits. If the study participant was found absent even after three visits, he was counted as non-response. The data obtained from the study was tabulated in MS Excel 2007 and result obtained was presented in the form of tables and diagrams, percentage etc. The data was calculated as proportions. Statistical analysis was done using SPSS 20. Standard statistical test Chi square test was used to measure the association between variables. Statistical significance was done at 95% confidence interval i.e. p value < 0.05.

Results

Socio demographic Characteristics

Out of total study participants 24.1% were belong to 12-24 months age group, 55.2% were males, 96.8% Hindu by religion, 58.7% were belonged to 1st birth order, 54.6% mothers were illiterate, 64.4% mothers were unemployed, 62.2% from nuclear families and 51.7% from lower middle class (class IV). [Table 1]

Environmental Characteristics

It has been observed that 81% of houses were Kutcha followed by 19% of pucca type. Overcrowding was found to be present in the household of 84.4% study subjects, 80.3% households use tap water as source of drinking water, 63.2% use community water supply. The study showed that 92.7% of subjects did not use same container for transport & storage of drinking water, 94% study subjects used vessel with handle to take out water from the stored containers while 3.2% used vessel without handle. It was found that 69.8% of the study subjects used boiling as method of water purification. It was seen that 76.2% of the households had sanitary latrine while 23.8% did not have latrine and they mostly prefer to go for open field defecation. Of the total study participants 53% of the household disposed their children excreta by throwing in to the garbage pit, 98.1% study subjects use water & soap for hand washing while 1.9% used only water. (Table 2)

Factors Associated with Diarrhoea

Prevalence of Diarrhoea among the study participants in last 2 weeks was found to be 26.4%. Diarrhoea was observed to be more prevalent in study subjects living in Pucca houses (30%), as compared to 25.5% study subjects living in Kutcha houses [Chi-square= 0.3032; p -value 0.5819]. Diarrhoea was 38.8% in overcrowded houses as compared to 24.1% where overcrowding was absent. This association was found to be statistically significant [Chi-square= 3.890; p -value < 0.05]. Diarrhoea was 62.5% in study subjects using pond as the source of drinking water. This association was found to be statistically significant [Chi-square= 20.648; p -value < 0.05]. [Table 3]

Diarrhoea was more prevalent in study subjects who used vessels without handle (50%). [Chi square=3.685, p -value 0.2976]. Diarrhoea was 66.7% amongst the

study subjects who used both boiling and straining by cloth as method of water purification [Chi square=5.822, p-value 0.4434]. Diarrhoea was equally prevalent amongst the study subjects whose households did not have latrines (26.7%) as well as those who had sanitary type of latrines (26.2%) [Chi square=0.005112, p-value 0.9430]. Diarrhoea was 35.7% where disposal of excreta was done by washing into drains followed by those who disposed the excreta by throwing in garbage pit (29.3%)[Chi square=4.004, p-value 0.2611]. Diarrhoea was 33.3% in study subjects who used only water for hand washing, [Chi square=4.004, p-value 0.2611] [Table 3]

Discussion

Out of 315 study subjects 24.1% were found to belong to 12-24 months age group. It was observed that 55.2% of the study subjects were males while 44.8% were females. 58.7% study subjects belonged to 1st birth order, 54.6% mothers were illiterate, Studies done by Ishore K *et al*, Shikur M *et al*, Tamiso Alemo *et al*, Borah H *et al* found that the majority of mothers had no formal education.^{6, 7, 8, 9}. Low maternal education implies ignorance and unawareness, which may in turn affect child care, health seeking behavior and poor maintenance of environmental sanitation.

In our study 64.4% mothers were unemployed, 62.2% study subjects belonged to nuclear families, 51.7% from lower middle class (class IV) as per Modified B. G. Prasad's Scale (updated for year 2018). Similar findings have been reported by Basa S¹⁰ in his study at urban slums of Delhi, with 44.8% subjects belonging to socio-economic class IV followed by class V. However, according to Gupta S K *et al*¹¹ 74.75% children belonged to either middle or higher middle class.

Prevalence of diarrhoea in the last 2 weeks was found to be 26.4%. According to a study by Borah H *et al* (26.2%)⁶ in slums of Dibrugarh, Assam the prevalence was 26.2% which is comparable to the finding of the present study. Similar findings have been reported by Ahmed F S *et al* in Kashmir (25.2%), Tambe A B *et al* in Tiko city, Africa (23.8%), Mengistie B *et al* (22.5%), Gedefaw M *et al* at northwest Ethiopia (21.6%), and Siziya S *et al* in Iraq (21.3%).^{9, 12, 13, 14, 15, 16}

However, a few studies^{17, 18, 7, 8, 19, 20, 10, 21} reported much higher rates, and a few also reported much lower rates of prevalence. Such variations can be explained by the living conditions of the study subjects and the occurrence of associated contributory factors, the design of study adopted including sample size, etc. The high prevalence of diarrhoea (26.4%) in our study may be due to factors like low socioeconomic status, poor literacy and improper excreta disposal of children, insanitary latrines, poor garbage disposal, ineffective hand washing and lack of health awareness among tea garden people. It further increases the load of diarrhoea due to lack of adequate and standard hygiene and sanitation practices in the community.

In the present study diarrhoea was observed to be more prevalent in subjects living in Pucca houses (30%). Our observation may be explained that though the respondents were found to be living in pucca houses these are not as per standards laid down by the Assam plantation labours rules.²². In spite of most houses being pucca, most houses were found to have poor housing condition, inadequate drainage around the house, presence of fly breeding sites, improper food storage facilities, which all may be the reasons for higher prevalence of diarrhoea among children residing there.

The study found that 84.4% of subject dwelled in overcrowded houses. The research demonstrated that

diarrhoea was more prevalent (38.8%) in the presence of overcrowding. This association was found to be significant [Chi-square= 3.890; p-value <0.05]. This may be due to lack of space for maintenance of personal hygiene, lack of proper sanitation facilities, improper handling of food and drinking water and poor nutritional quality of food consumed, ignorance of family members of the tea garden community.

In our present study it was found that 80.3% households used tap water as source of drinking water. Diarrhoea was 62.5% in subjects using pond water for drinking followed by 27.7% among those using tap water. (This association was found to be statistically significant. Increased prevalence of diarrhoea in subjects using pond water may be due to the fact that surface water always has more chance of contamination, and if not properly treated, may predispose to gastrointestinal infections. Non availability of tap water and tube well near the household was one of the reasons to use pond and river as source of water. Moreover, dumping of waste and garbage near the pond from where water is consumed may be another reason of diarrhoea.

The study revealed that 94% of the study subjects use vessel with handle to take out water from the storage vessel. It was observed that diarrhoea was more prevalent in study subjects who used vessels without handle (50%). However the difference was not statistically significant. The finding of the present study confirmed that handling water directly by hand may lead to contamination by unclean hands and fingers.

In the current study it was observed that 69.8% of the study subjects use boiling as water purification method followed by use of water filter (16.2%), use of boiling and water filter both (7.6%). Diarrhoea was observed to be more prevalent in study subjects who use both

boiling and then straining by cloth as method of purification of water (66.7%), followed by only straining by cloth (33.3%). However the difference was not statistically significant (Table 3). Diarrhoea was found to be more prevalent in those who used both boiling and straining by cloth probably due to the fact that they practiced straining after boiling. This practice may increase the risk of water contamination during the process of straining as the tea garden dweller do not maintain the cleanliness of the cloth after each use which predisposes to the microorganisms.

In the study, it was seen that 76.2% of the households had sanitary latrines. Diarrhoea was found to be equally distributed amongst both subjects whose households did not have latrines (26.7%), and had latrines (26.2%). On the other hand, Dessalegn *et al* observed in his study that availability of latrine facility had a significant association. The finding in the present study may be due to the practice of open field defecation among under five children irrespective of the presence of a latrine in the house.³

In the current study, it was observed that in 53% of the households, excreta of under-five children was disposed by throwing it into garbage pit. It may be noted that among the study community there is lack of awareness and traditional practices of disposal of excreta especially of the children in the open is still prevailing.

It was observed that diarrhoea was 35.7% in study subjects where disposal of excreta was done by washing into drains followed by those who dispose the excreta by throwing into garbage pit (29.3%) or rinsing in the toilet (27.3%). However, the observation was not statistically significant. This finding may be explained by the fact that the excreta of even small children contain germs and improper disposal of their excreta

may lead to maintenance of the infectious agent in the environment which in turn affects more children.

The present study showed that 98.1% of the respondents used soap & water for hand washing, while 1.9% used only water. Diarrhoea was more prevalent in study subjects who used only water (33.3%) for hand washing. Shikur M *et al* in their study found that the risk of developing diarrhoea was higher among children whose mother had poor hand washing practice when compared with children whose mother had good hand washing practice. Hand washing is a very simple, cost effective and efficient means of protection from all types of germs. Soap has germicidal property and the use of soap lowers the episodes of diarrhoea in community.⁴⁸

Conclusion

The first few years of life are the most crucial period of life as this age is known for accelerated growth and

Table:1 Socio demographic Characteristics

Variables		Frequency	Percentage (%)
Age of Child	0-6 months	16	5.08
	6-12 months	43	13.65
	12-24 months	76	24.13
	24-36 months	59	18.73
	36-48 months	52	16.51
	48-60 months	69	21.90
Sex of Child	Male	174	55.24
	Female	141	44.76
Religion	Hindu	305	96.83
	Muslim	9	2.86
	Christian	1	0.32
Birth Order	1 st	185	58.73
	2 nd	103	32.70

development; and any adverse influences during this period may result in severe limitations in their development. The present study showed that the two weeks prevalence of diarrhoea in under five children of tea garden community was 26.4%. This was much higher than the state average of 2.9% as found in NFHS4. The associated factor identified for high morbidity were overcrowded household, low maternal Education, inadequate provision of safe drinking water, poor hand hygiene, Insanitary disposal of excreta. Therefore, tea garden management needs to focus on cost effective measures including health awareness, adequate provision of safe drinking water, promotion of sanitary practices, provision of oral rehydration solution and zinc supplements, overall improved case management and research in order to reduce the prevalence of diarrhoea among the under-five children in tea garden community.

	3 rd	25	7.94
	4 th & above	2	0.64
Literacy status	Illiterate	172	54.60
	Primary	47	14.92
	Secondary	81	25.71
	College and above	15	4.76
Occupation	Permanent Worker	38	12.06
	Temporary Worker	74	23.49
	Unemployed	203	64.44
Type of Family	Nuclear	196	62.22
	Joint	119	37.78
Social class	I	1	0.32
	II	6	1.90
	III	43	13.65
	IV	163	51.75
	V	102	32.38

Table: 2 Environmental Characteristics

Variables		Frequency	Percentage (%)
Type of House	Kutcha	255	80.95
	Pucca	60	19.05
Overcrowding	Absent	266	84.44
	Present	49	15.56
Source of water	Tap water	253	80.32
	Tube well	27	8.57
	Well	18	5.71
	Pond	16	5.08
	River	1	0.32
Ownership of source of water	Individual	116	36.82
	Community	199	63.17

Same container for transport & storage	No	292	92.70
	Yes	23	7.30
Handling water means	Vessel with Handle	296	93.97
	Vessel without Handle	10	3.17
	From Tap	2	0.63
	Poured Out	7	2.22
Water treatment Method	Boiling	220	69.84
	Water filter	51	16.19
	Straining by cloth	3	0.95
	Boiling & Water filter	24	7.62
	Boiling & Straining by cloth	6	1.90
	None	8	2.54
	Others (take in tea form)	3	0.95
Type of latrine	Available	240	76.19
	Not available	75	23.81
Disposal of excreta of Under 5 child	Thrown in Garbage pit	167	53.01
	Buried	90	28.57
	Washed into Drain	14	4.44
	Rinsed in toilet	44	13.97
Material used for hand washing	Water & soap	309	98.09
	Water	6	1.90

Table 3: Environmental characteristics and Diarrhoea

Variables		Had Diarrhoea		No Diarrhoea		Total	P-value
		Frequency	Percentage (%)	Frequency	Percentage (%)		
Type of House	Kutcha	65	25.49	190	74.51	255	0.5819
	Pucca	18	30.00	42	70.00	60	
Overcrowding	Absent	64	24.06	202	75.94	266	<0.05
	Present	19	38.78	30	61.22	49	
Source of Water	Tap water	70	27.67	183	72.33	253	<0.05
	Tube well	1	3.70	26	96.30	27	
	Well	2	11.11	16	88.89	18	

	Pond	10	62.50	6	37.50	16	
	River	0	0.00	1	100.00	1	
Water Handling Means	Vessel with Handle	76	25.68	220	74.32	296	0.2976
	Vessel without Handle	5	50.00	5	50.00	10	
	From Tap	0	0.00	2	100.00	2	
	Poured Out	2	28.57	5	71.43	7	
Water treatment Method	Boiling	54	24.55	166	75.45	220	0.4434
	Water filter	15	29.41	36	70.59	51	
	Straining by cloth	1	33.33	2	66.67	3	
	Boiling & Water filter	6	25.00	18	75.00	24	
	Boiling & Straining by cloth	4	66.67	2	33.33	6	
	None	2	25.00	6	75.00	8	
	Others (take in tea form)	1	33.33	2	66.67	3	
Type of Latrine	Sanitary	63	26.25	177	73.75	223	0.9430
	Not available / Open defecation	20	26.67	55	73.33	75	
Disposal of Excreta	Thrown in Garbage pit	49	29.34	118	70.66	167	0.2611
	Buried	17	18.89	73	81.11	90	
	Washed into Drain	5	35.71	9	64.29	14	
	Rinsed in toilet	12	27.27	32	72.73	44	
Material used for Hand washing	Water & soap	81	26.21	228	73.79	309	0.6950
	Water	2	33.33	4	66.67	6	

Reference

1. WHO/ Diarrhoeal disease [internet] <http://www.who.int/news-room/factsheets/detail/diarrhoeal-disease> [Accessed on 15 MARCH 2018].
2. Tondare MB, Raje VV, Kakade SV, Rayate MV. Acute Diarrhoeal Diseases Among Preschool Children in Western Maharashtra, India. *Natl J Community Med.* 2014; 5(4):383.
3. Gupta SP. Nutrition: Indian Perspective. *Indian Journal of Public Health* 1999; 33(1):12-16.
4. UNICEF-Child info, monitoring the situation of children and women, 2011[Accessed on 15 MARCH 2018].
5. Deshpande K, Kakkar R, Diwan V. Access to quantity and quality water: Problems perceived by residents of village Palwa in Ujjain district. *Indian Journal of Community Medicine.* 2007;32(4):295.
6. Ishore K, Bhattacharjee S, Das DK. Morbidity Among Tribal Under-Five Children of Tea Garden Areas in a Block of Darjeeling District, West Bengal: A Cross-Sectional Study. *Journal of Clinical and Diagnostic Research.* 2015; 9(8):1-3.
7. Shikur M, Tilahun M, Tamiru D. Morbidity and Associated Factors of Diarrheal Diseases Among Under Five Children in Arba-Minch District, Southern Ethiopia, 2012. *Science Journal of Public Health.* 2013; 1(2): 102-106.
8. Tamiso A, Yitayal M, Awoke A. Prevalence and Determinants of Childhood Diarrhoea among Graduated Households, in Rural Area of Shebedino District, Southern Ethiopia, 2013. *Science Journal of Public Health.* 2014; 2(3):243-251.
9. Borah H, Gogoi G, Saikia H. Prevalence of diarrhoea among under-five children and health seeking behaviour of their mothers in slums of Dibrugarh town, Assam. *Ind. J. Sci. Res. and Tech.* 2014 2(1):16-19.
10. Basa S. Prevalence of Diarrhoea among Under-Five children and Health Seeking Behavior of their Mothers in an Urban Slum of Delhi. *Asian Journal of Biomedical and Pharmaceutical Sciences.* 2015,18; 5(45):8-11.
11. Gupta S, Gupta SK, Jamwal DS, Kumar D. Incidence of diarrhea among under-five children in a rural area of Jammu– A longitudinal Study. *IJMCH.* 2011; 13(2):1-6.
12. Ahmed SF, Farheen A, Muzaffar A, Mattoo GM. Prevalence of Diarrheal Disease, its Seasonal and Age Variation in under- fives in Kashmir, India. *International Journal of Health Sciences.* 2008; 2(2):126-133.
13. Tambe AB, Nzefa LD, Nicoline NA. Childhood Diarrhea Determinants in Sub-Saharan Africa: A Cross Sectional Study of Tiko-Cameroon. *Challenges.* 2015; 6: 229-243.
14. Mengistie B, Berhane Y, Worku A. Prevalence of diarrhea and associated risk factors among children under-five years of age in Eastern Ethiopia: A cross-sectional study. *Open Journal of Preventive Medicine.* 2013; 3 (7): 446-453.
15. Gedefaw M., Takele M., Aychiluhem M, Tarekegn M. Current Status and Predictors of Diarrhoeal Diseases among Under-Five Children in a Rapidly Growing Urban Setting: The Case of City Administration of Bahir Dar, Northwest Ethiopia. *Open Journal of Epidemiology.* 2015;5: 89-97.
16. Siziya S, Muula AS, Rudatsikira E. Diarrhea and acute respiratory infections prevalence and risk factors among under-five children in Iraq. *Italian Journal of Pediatrics.* 2009; 35(1):8.

17. Kalakheti B, Panthee K, Jain KC. Risk factors of diarrhea in children under five years in urban slums: an epidemiological study. *Journal of Lumbini Medical College*. 2016;4(2):94-8.
18. Berhe H, Mihret A, Yitayih G. Prevalence of diarrhea and associated factors among children under-five years of age in Enderta Woreda, Tigray, Northern Ethiopia, 2014. *International Journal of Therapeutic Applications*.2016; 31: 32-37.
19. Dessalegn. M, Kumie A, Tefera W. Predictors of under-five childhood diarrhea: Mecha District, west Gojjam, Ethiopia. *Ethiop. J. Health Dev* 2011; 25(3):192-20
20. Arif A, Naheed R. Socio-economic determinants of diarrhea morbidity in Pakistan. *Academic research International*. 2012; **2(1)**:490-518
21. Samya V, Stanly AM. Acute Diarrhea and Acute Respiratory Infection among Less than 5 Year Old Children: A Cross-Sectional Study. *International Journal of Scientific Study*.2015; 3(7):149-153
22. Government of Assam. The Assam Plantations Labour Rules, 1956. Available from:<http://labourcommissioner.assam.gov.in/sites/default/files/Plantations/20Labour/20Rules>. Accessed on 3 August. 2018.