Prevalence of childhood diarrhoea and treatment practices adopted by women in Northeast India.

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ABSTRACT

Death due to diarrhoea at all ages in Northeast India is 8.3% which is more than 7.1% of the National level. The region is having the lowest percentage of children for whom sought diarrhoea treatment from health care facilities or provider. Geographically the region is hilly terrains and having great diversity in traditions and socio-cultural, inhabited by tribes and people belonging to the different culture and ethnic community.Under such diversity the paper attempt to understand the women's knowledge practices on diarrhoea treatment and seeking behaviour whose child (< 5-years) are suffering from diarrhoea. Data from the District Level Household Survey (DLHS- 4) 2012-13 were used. Women were asked whether a child (<5- years) had suffered from diarrhoea two weeks prior the survey period. Data were collected on women's knowledge about diarrhoea treatment, types of diarrhoea treatment methods (Increase liquid food intake, Seek advice/treatment, Administered ORS/Zinc) used. Multivariate logistic regression was performed to find the determinants of using diarrhoea treatment and knowledge about diarrhoea. Of the 803 children with diarrhoea, 45.33% were taken to the health centre. Seeking for treatment is ranging from 69.57% in Tripura to 19.40% in Nagaland. Many women are having knowledge about diarrhoea treatment, but prefer to used liquid food instead of HAF/ORS/Zinc and very few seek treatment from the healthcentre. Women not seeking treatment prefer to used liquid food but those seek treatment from Government and Private centre prefer to used HAF/ORS/Zinc.Women wealth, education and significantly increase women knowledge about treatment of diarrhoea. A female child is more preferred for seeking treatment. ANC visit increases women knowledge about diarrhoea knowledge. Most of the women from Tripura used HAF/ORS/Zinc which is a better method for the treatment of diarrhoea mostly advice by Government and Private health centre.The child gets proper care if women are aware of diarrhoea treatment. Health workers need to inform the women's about methods of diarrhoea treatment.

Keywords: North-East India, Under five Childhood diarrhoea, Knowledge on diarrhoea treatment, Treatment seeking.

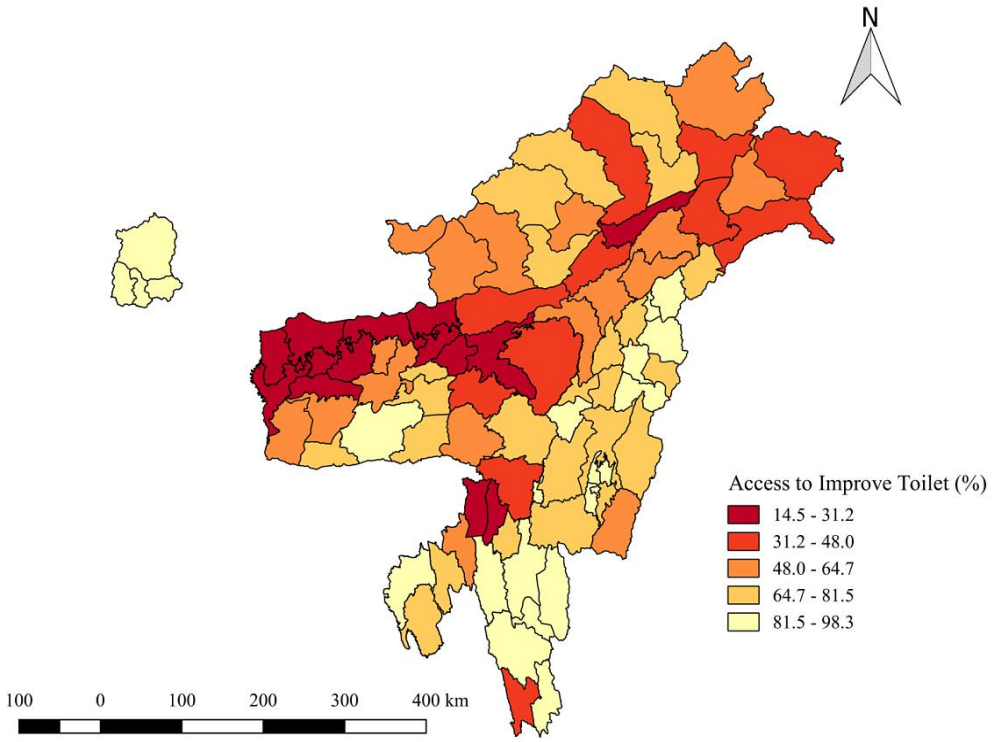
INTRODUCTION

Worldwide about 9 percent deaths among children under five years of age are due to diarrhoea, which converts to 1600 death per day in the year 2013. South Asia and Sub-Saharan Africa are the two regions where most of the diarrhoea death among children under two years of age mostly occur.[3]The total number of annual diarrhoea death among children under five from 2000 to 2012 has decreased by almost 50 percent from 1.3 million in 2000 to 0.6 million in 2012.[18] The Sustainable Development Goal (SDG) target for under-five mortality rate is 25 deaths per 1000 live birthby 2030 but at present, 79 countries have an under-five mortality rate above 25, and 47 of them will not reach the SDG target if the current trend in reducing under-five mortality is continuing.[19]In the year 2012, under-five global deaths was 6.6 million and most are from preventable causesdue to pneumonia and diarrhoea.[18]Diarrhoea deathsare the preventable death if the women of the child or caregiver treated the child with the recommended treatment method.The new diarrhoea treatment methods which have been recommended by the World Health Organization (WHO) and the United Nations Children Emergency Fund(UNICEF) is the use of low osmolarity oral rehydration salts (ORS), a fluid commonly available at home, continue breastfeeding and using of zinc supplement.[14]In developing countries, most of the children suffering from diarrhoea are treated at home and women are the main caregiver,[1]therefore, women's educational level and knowledge about diarrhoea treatments are crucial. Zinc is found that it improved the function of the immune system, studies conclude that if children under five years of age taking (10-20 mg) zinc supplements per day it results in the drastic reduction of the severity and duration of diarrhoeal disease.[15]Globally among all the children suffering from diarrhoea, only 40 percent were treated with oral rehydration therapy and continue breastfeeding. Sub-Saharan Africa and South Asia, the region with the most diarrhoea death have the lowest coverage of the WHO/UNICEF recommended diarrhoea treatment.[3]When the home remedy or local method of diarrhoea treatments are not effective at all and the severity of the illness is high, then the women decide to seek treatment help from healthcare facilities[10]this is because some women or caregiver believe that traditional method is better than oral rehydration therapy for treating diarrhoea.[11]

According to the latest National Family Health Survey (NFHS-IV), the level of the under-five mortality rate for India has now reduced to 50 from 74 deaths per 1,000 live births.In India, approximately 68 percent of the children suffering from diarrhoea during the last two weeks were taken to the healthcare facilities, 51 percent received ORS and only 20

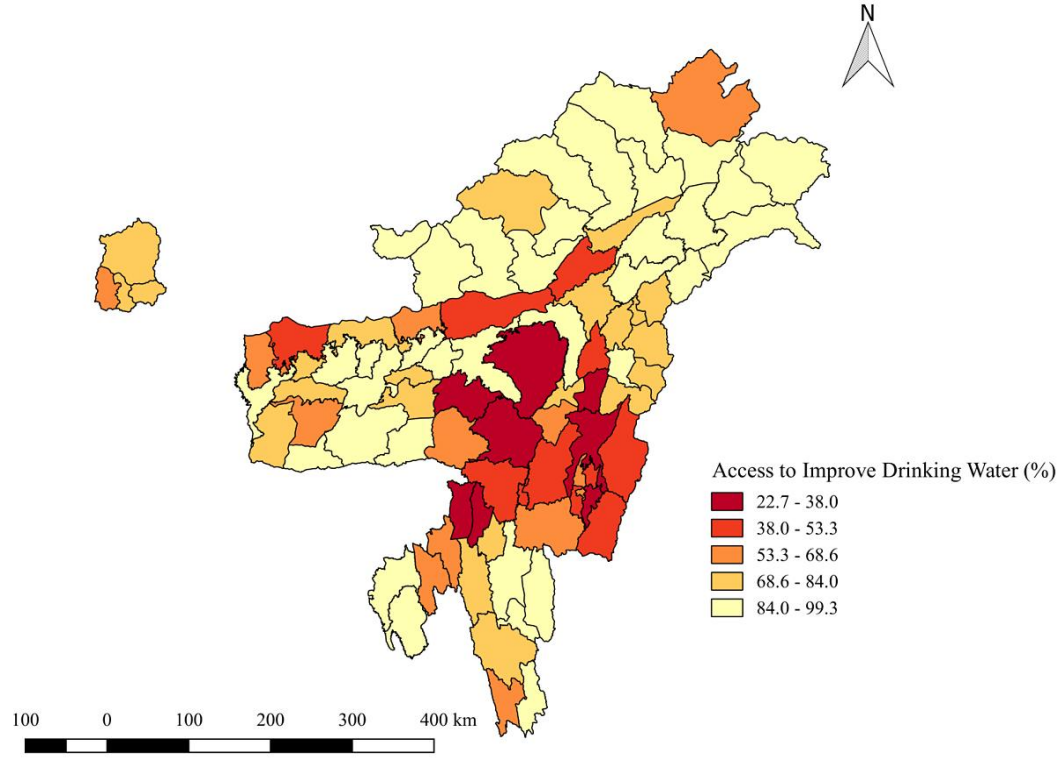
percent received zinc.[20]Thedecision whether a child suffering from diarrhoea will be taken to the healthcare facilities or not depend on the severity of the illness and the economic conditions of the child family, but a child will be taken to health care facilities irrespective of gender.[6]Studies in India found that discrimination against girls child in receiving ORS treatment since homemade remedy solution made from salt, sugar and water is easily available and cheap compared to ORS solution.[21] A Study in India found that a low usage of Oral Rehydration Therapy is found among groups of young women having a low educational level and coming from poor economic status.[7]A study in rural Aligarh found a gap in the knowledge, attitude and practices of the women's regarding the home base management of diarrhoea.[8] A child suffering from diarrhoea and born at private health centre had a higher chance of being taken to health care facilities for seeking treatment of diarrhoea as compared to a child born at home.[9]

Northeast India consists of eight states Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim and Tripura the region is connected with the mainland India through a narrow land called the Siliguri Corridor or the Chickenneck of Inda which is located in West Bengal.[22]Geographically the region is hilly terrains known for having great diversity in traditions and socio-cultural, inhabited by tribes and people belonging to the different culture and ethnic community. The tribal population are mostly dominated in this region except for Assam, Manipur and Tripura. Healthcare seeking behaviour from any specific health practitioners among the tribal communities mostly is encouraged by the cultural belief.[23]A study in Northeast India found that the educational level of the household head and his or her association with any tribal community will influence the decision-making of healthcare utilisation.[12]During the year 2004-06, the cause of death for all ages due to diarrhoea disease in Northeast India is 8.3 percent and 7.1 percent at the national level.[5] The region of Northeast and East India have the lowest percentage of children for whom sought treatment for diarrhoea from health care facilities or provider. Meghalaya and Tripura the only states in Northeast India which are having the highest percentage of children for whom sought treatment for diarrhoea and usage of ORS packets.[4]The main reason in Northeast India for which people reluctant to seek treatment from government health facilities are ‘no nearby facility’, ‘poor quality of care’ and ‘waiting time too long’.[24]As in other developing countries demographic and socioeconomic factors also influence the knowledge and seeking treatment behaviour for diarrhoea disease in North-East India. The aim of this study was to identify the contributing factors that influence women knowledge about diarrhoea treatment and seeking treatment practices for diarrhoeal disease.



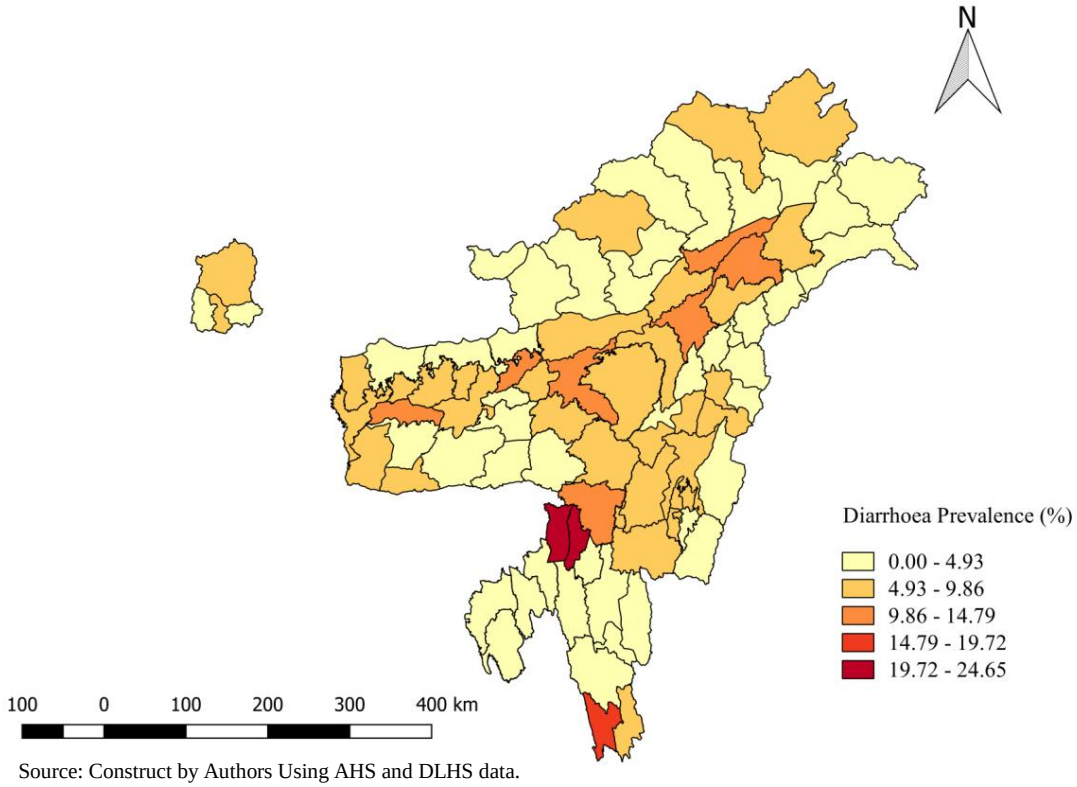
Source: Construct by Authors using Census 2011, AHS and DLHS data

Figure 1: District wise Percent coverage of Improved Toilet Facilities in North-East India.



Source: Construct by authors using Census 2011, AHS and DLHS data

Figure 2: District wise Percent coverage of Improved Water Source in North-East India.



Source: Construct by Authors Using AHS and DLHS data.

Figure 3: District wise Prevalence of Diarrhoea among Children under five years in North-East India.

Access to Improved Toilet, Improved Drinking Water and Diarrhoea Prevalence in Northeast India.

From the figure 1, we observed a variation in term of percent coverage of improved toilet facilities in all the eight states of Northeast India. Out of the 27 districts in Assam, 14 districts fall under the first category (14.5-31.2) in term of access to improved toilet facilities. The coverage of improved toilet facilities in Mizoram is very high, 6 out of 8 districts shows that the percent coverage of improved toilet facilities is greater than 81.5 percent, but only two districts Kolasib and Lawngtlai where the coverage is below 81.5 percent. Sikkim being the only state in Northeast India known for free open defecation shows that all the 4 districts have a percent coverage of improved toilet above 81.5 percent.

Figure 2, about 14 districts in the state of Arunachal Pradesh have 84 to 99.3 percent coverage of access to improved drinking water also in Mizoram 7 district shows the coverage of access to improved drinking water is more than 68.6 percent. Manipur is the only states in the Northeastern region showing very low coverage on improved drinking water, about 7 out of 9 districts the percent coverage of improved drinking water is below 50 percent.

Figure 3, shows the diarrhoea prevalence in the district of Northeast India. Karimganj and Hailakandi the two district in Assam which are showing very high prevalence (19.72 to

24.65) of diarrhoea diseases, and these two district are the districts which are having the low access to improved toilet facilities and improved drinking water.

SOURCE OF DATA

The secondary data for the present study is available from the District Level Household Survey (DLHS-4) conducted during the year 2012 to 2013. The survey was undertaken by the Ministry of Health and Family Welfare, Government of India and the International Institute for Population Sciences (IIPS) being the nodal agency carry out the survey. The sampling design adopted in the DLHS-4 for the selection of the representative sample for each district multistage sampling, stratified sampling, probability proportional to sample size with replacement and Computer Assisted Personal Interview (CAPI) was used for data collection. In Northeast, only Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura were covered in this survey but Assam was not included because it was covered under the Annual Health Survey of India. Sample households were visited by the trained interviewer and data about socioeconomic status, demography, women and child health status and biomarker was collected from the ever-married women of age 15-49 years who is the usual resident of the sample household or visitor who stayed in the sample household the night before the interview.

METHODS

The trained interviewer asked the women age 15-49 years whether the child age less than five years is suffering from diarrhoea during last two weeks preceding the survey and if the response is yes then whether the women know what to do when a child is suffering from diarrhoea.Also, questions were asked whether the women administered any liquids food, Home available Fluid (HAF), Oral Rehydration Solution (ORS), and Zinc during the episode of diarrhoea seek advice/treatment for diarrhoea from any source.

Data analysis was performed using a statistical software STATA version 12. Pearson's chi-square analysis was used to assess the association of the individual background characteristics and dependent variable.We used the multivariate logistic regression to determine the factors which may influence women knowledge about diarrhoea treatments and treatment seeking behaviour for diarrhoea. Only the variables which are less than 0.05 in the Pearson's chi-square measure of association are included as an independent variable in the model. To examine the knowledge about diarrhoea treatment and seeking treatment behaviour of the women, a sample of 803 women whose child under five years of age

suffering from diarrhoea was used. The four dichotomized dependent variables which are considered in this study are “Women knowledge about diarrhoea treatment”, “Seeking treatment/advice from health centre”, “Increase liquid food intake to a sick child” and “Administered HAF/ORS/Zinc to a sick child”. The dichotomized dependent variable on whether the women are having the knowledge about diarrhoea treatment is coded as(1) represent women having knowledge about diarrhoea treatment and coding (0) represent women did not have knowledge about diarrhoea treatment. Similarly, for the dichotomized dependent variable on whether the women seek treatment/advice from the health centre, the coding (1) represent women are seeking treatment/advice from the health centre and coding (0) Women did not seek treatment/advice from the health centre. For the dichotomized dependent variable on whether women give liquid food intake to a child suffering from diarrhoea the coding (1) represent women give liquid food to a child and coding (0) represent women did not give liquid food to a child, and for the dichotomized dependent variable on whether women administered HAF/ORS/Zinc to a sick child from diarrhoea the coding (1) represent women administered HAF/ORS/Zinc to a sick child and coding (0) represent women did not administer HAF/ORS/Zinc to a sick child. Also, we used Principal Component Analysis (PCA) to construct the household wealth index using the information on household assets, ownership of consumer items, dwelling characteristics.

RESULTS

Distribution of Study Participants

Table 1 shows that the sample number of children (<5 years) is 18,300 of these 803 children were reported to be suffering from diarrhoea during the past two weeks prior the survey period. From Table6 in the Appendix, 53.92% male and 46.08% female child are having diarrhoea during the last two weeks before the survey.The overall mean age of a child was 26.1 (±1.1) months, and the mean age of mothers was 27.7 (±0.4) years. Almost half of the children suffering from diarrhoea are more than 23 months of age. About 62.56% of the mothers study till the secondary level of education but only 2.31% of the mothers are illiterate. About 35.49% of the women belong to the poor household and 29.89% women belong to the rich household. Almost three part (78.46%) of the women belong to the Schedule Tribes community and 56.91% are Christian. From the 803 women whose child are suffering from diarrhoea, 617 women have the knowledge of diarrhoea treatment.The types of diarrhoea treatment method used by the women whose children are suffering from diarrhoea were asked and the results show that 702 women increase liquid food intake to a

sick child, 364women seek treatment/advice from health care facilities or provider, and 448women administered HAF/ORS/Zinc to a sick child and.

Table 1: Summary diarrhoea cases and Women using different type of Diarrhoea treatment, DLHS-4, 2012-13

Had Diarrhoea during last two weeks:		**N**	**Percentage**
	No	17,497	95.61
	Yes	803	4.39
Types of diarrhoea treatment:			
Increase liquid food intake	**No**	101	12.58
	Yes	702	87.42
Seek treatment/advice	**No**	439	54.67
	Yes	364	45.33
Administered HAF/ORS Zinc	**No**	349	43.79
	Yes	448	56.21
Women Knowledge about diarrhoea treatment	**No**	186	23.16
	Yes	617	76.84

Association between Women seeking treatment and Knowledge about diarrhoea treatment with Background characteristics.

Table 2 shows a chi-square measure of association between women seeking diarrhoea treatment for a child and knowledge about diarrhoea treatment. Women knowledge about diarrhoea treatment and women educational level are significantly related ($P<0.01$).Among the women whose child are suffering from diarrhoea, 46.67% of the illiterate women and 90.57% of the women with above secondary level of education are having knowledge about diarrhoea treatment.About 86.25% of the women belonging to the wealthier household are statistically significant in having more knowledge about diarrhoea treatment as compared to 67.37% of the women belonging to the poor household. Among the women receiving advice on breastfeeding during ANC visits 89.56% of them are having knowledge about diarrhoea treatment.We observed a statistically significant gender base difference in the distribution of children with respect to seeking diarrhoea treatment, 50.27% of the women whose female child is suffering from diarrhoea sought treatment for diarrhoea but only 41.11% of the women who sought treatment for a male child suffering from diarrhoea.Among the women belonging to the poor household only 34.04% are seeking diarrhoea treatment for a child and 53.08% of the Non Schedule Caste women are seeking diarrhoea treatment as compared to only 42.57% of the Schedule Caste women sought treatment for diarrhoea. States wise we see that 95.65% of the women from Tripura are having knowledge about diarrhoea treatment and 69.57% seek treatment for diarrhoea but only 19.40% of the women from Nagaland seek treatment for diarrhoea.

Table 2: Association between women Seeking treatment for a child and Knowledge about diarrhoea treatment according to Demographic and Socio-economic characteristics, DLHS-4, 2012-13.

Background Characteristics	Having Knowledge about Diarrhoea treatment n (%)	P value	Sought diarrhoea treatment n (%)	P value
Sex of Child				
Male	NA		178 (41.11)	<0.01
Female	NA		186 (50.27)	
Women age				
<20 years	25 (69.44)	0.32	19 (52.78)	0.48
20-29 years	366 (75.93)		222 (46.06)	
>29 years	226 (79.30)		123 (43.16)	
Women Education				
Illiterate	7 (46.67)	<0.01	6 (40.00)	0.07
Primary	114 (65.14)		75 (42.86)	
Secondary	351 (86.45)		202 (49.75)	
above secondary	48 (90.57)		33 (62.26)	
Wealth Quintile				
Poor	192 (67.37)	<0.01	97 (34.04)	<0.01
Middle	218 (78.42)		142 (51.08)	
Rich	207 (86.25)		125 (52.08)	
Received advice on breastfeeding				
No	454 (73.11)	<0.01	NA	
Yes	163 (89.56)		NA	
Caste				
ST	443 (74.83)	0.024	252 (42.57)	<0.01
Non-ST	174 (82.46)		112 (53.08)	
Residence				
Rural	465 (73.81)	<0.01	258 (40.95)	<0.01
Urban	152 (87.86)		106 (61.27)	
Religion				
Christian	345 (75.49)	<0.01	198 (43.33)	0.02
Hindu	172 (88.66)		103 (53.09)	
Buddhist	39 (52.00)		25 (33.33)	
Other	61 (79.22)		38 (49.35)	
States				
Sikkim	44 (93.62)	<0.01	24 (51.06)	<0.01
Arunachal Pradesh	139 (73.54)		86 (45.50)	
Nagaland	49 (73.13)		13 (19.40)	
Manipur	154 (92.77)		65 (39.16)	
Mizoram	134 (60.63)		104 (47.06)	
Tripura	44 (95.65)		32 (69.57)	
Meghalaya	53 (79.10)		40 (59.70)	
Total	**617 (76.84)**		**364 (45.33)**	

Association between Background characteristics and Women administered Liquid food and HAF/ORS/Zinc to a sick Child.

Table 3, shows a significant association between the women having knowledge about diarrhoea treatment and administered liquid food to a sick child, among the women having knowledge about diarrhoea treatment 74.23% of them administered liquid food to a child having diarrhoea whereas 64.52% of the women not having knowledge about diarrhoea treatment administered liquid food to a child. Women education showed a statistically significant association with women administered of HAF/ORS/Zinc to a sick child. Among those women which administered HAF/ORS/Zinc only 44.17% belong to the poor household

and 69.79% belong to the wealthier household. Nagaland the only state in Northeast India having a low percentage of women administer HAF/ORS/Zinc to a sick child. Among the women who did not have any knowledge about diarrhoea treatment only 35.87% of them administered HAF/ORS/Zinc as compared to 62.11% of the women having knowledge of diarrhoea treatment. A significant association between health care seeking facilities and administered of HAF/ORS/Zinc was observed, most of the women seeking treatment from the Government and Private facilities used HAF/ORS/Zinc as the preferred treatment for diarrhoea.

Table 3: Association between Women administered liquid food and HAF/ORS/Zinc to a sick child with the Demographic and Socio-economic characteristics, DLHS-4, 2012-13.

Background Characteristics	Give Liquid food to a child during Diarrhoea n (%)	P value	Administered HAF/ORS/Zinc n (%)	P value
Sex of Child				
Male	304 (70.21)	0.23	229 (53.50)	0.09
Female	274 (74.05)		219 (59.35)	
Women age				
<20 years	23 (63.89)	0.24	15 (41.67)	0.198
20-29 years	341 (70.75)		274 (56.96)	
>29 years	214 (75.09)		159 (56.79)	
Women Education				
Illiterate	12 (80)	0.71	6 (42.86)	<0.01
Primary	127 (72.57)		85 (49.13)	
Secondary	296 (72.91)		251 (61.82)	
above secondary	42 (79.25)		41 (78.85)	
Wealth Quintile				
Poor	196 (68.77)	0.32	125 (44.17)	<0.01
Middle	205 (73.74)		159 (56.99)	
Rich	177 (73.75)		164 (69.79)	
Caste				
ST	419 (70.78)	0.20	318 (54.17)	0.053
Non-ST	159 (75.36)		130 (61.90)	
Residence				
Rural	449 (71.27)	0.39	330 (52.88)	<0.01
Urban	129 (74.57)		118 (68.21)	
Religion				
Christian	321 (70.24)	0.3	237 (52.32)	<0.01
Hindu	153 (78.87)		127 (66.15)	
Buddhist	56 (74.67)		39 (51.32)	
Other	48 (62.34)		45 (59.21)	
States				
Sikkim	40 (85.11)	<0.01	26 (56.52)	<0.01
Arunachal Pradesh	121 (64.02)		91 (48.66)	
Nagaland	45 (67.16)		21 (31.34)	
Manipur	125 (75.30)		97 (59.51)	
Mizoram	161 (72.85)		129 (58.37)	
Tripura	39 (84.78)		42 (87.50)	
Meghalaya	47 (70.15)		42 (64.62)	
Knowledge about Diarrhoea Treatment				
No	120 (64.52)	<0.01	66 (35.87)	<0.01

Yes	458 (74.23)		377 (62.11)	
Health Care Seeking				
Not Seeking care	302 (68.64)	0.02	173 (40.05)	<0.01
Government	204 (78.16)		197 (76.36)	
Private	72 (70.59)		73 (72.28)	
Total	**578 (71.98)**		**448 (56.21)**	

Figure 4: Percentage of Children under Five years with diarrhoea two weeks prior the survey period by types of diarrhoea management practice and by the source of treatment.

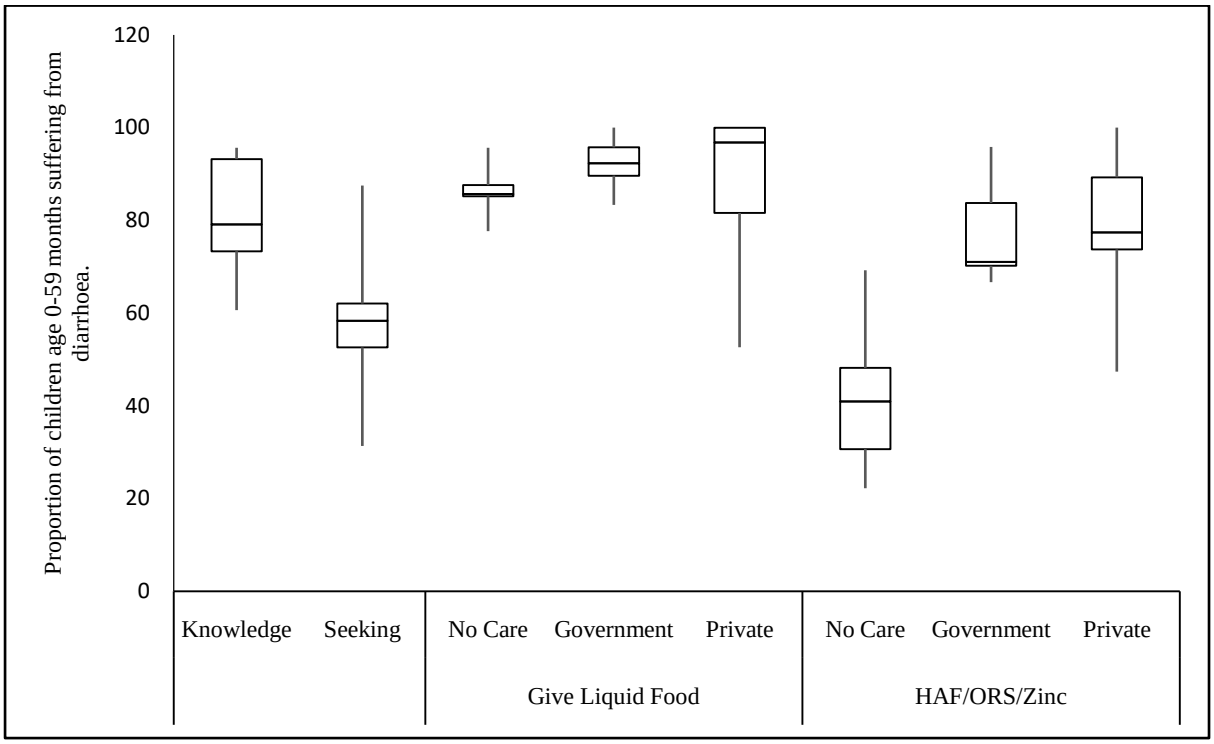


Figure 2 and Table 5 in the Appendix present the result of diarrhoea management by the source of treatment. The percentage of women having knowledge on diarrhoea treatment from all the states of Northeast India was high with a median of 79.1% (ranges 60.63% in Mizoram to 95.65% in Tripura), but the number of women seeking treatment for diarrhoea from health care facilities is low with a median of 58.37% (range 31.34% in Nagaland to 87.5% in Tripura). In all the states of Northeast India, women who sought treatment outside the home are more likely to report of administered liquid food to a sick child than those women not seeking treatment outside the home but less likely to report of administered HAF/ORS/Zinc. Also, the variability of the percentage of women giving liquid food to a sick child is very low among women not seeking treatment outside the homes compared to women seek treatment from private facilities. But the variability of the percentage of women administered HAF/ORS/Zinc to a sick child is high irrespective of the source of treatment. The percentage of women not seeking treatment outside home but administered

HAF/ORS/Zinc is low with a median value of 40.91% (range 22.22% in Nagaland to 69.23% in Tripura), but the percentage of administered HAF/ORS/Zinc to a sick child for women seeking treatment from Government and Private facilities is high with a median value of 71.05% (range 66.67% in Nagaland to 95.83% in Meghalaya) and 77.42% (range 47.37% in Arunachal Pradesh to 100% in Sikkim and Tripura).

Determine the demographic and socio-economic factors which influencing women knowledge about diarrhoea treatment and seeking treatment practices.

Based on the result of the bivariate analysis of table 2, the variables with a p-value <0.05 were selected as predictor variables in the Model 1, the variables are women education, wealth quintile, received advice on breastfeeding, caste, residence, religion and states were. Similarly, the predictor variables included in Model 2 having a p-value <0.05 are sex of the child, wealth quintile, caste, residence, religion and states. The result of the adjusted odds ratio from multivariate logistic regression table 4 shows that women having secondary level of education (AOR 3.38, 95% CI 1.06-10.75) and above secondary level education (AOR 3.79, 95% C.I 0.81-17.63) were 3.38 times and 3.79 times more knowledgeable to treat a child suffering from diarrhoea as compared to the illiterate women. Comparing to the poorer women, wealthier women (AOR 3.21, 95% CI 1.72-5.99) were 3.21 times more knowledgeable to treat a child having diarrhoea and (AOR 2.44, 95% CI 1.65-3.60) she will be 2.44 times more likely to seek treatment for a sick child suffering from diarrhoea. We observed a statistically significant gender bias in seeking treatment from the health centre, a female child suffering from diarrhoea (AOR 1.34, 95% CI 0.99-1.80) were 1.34 times more likely to seek treatment/advice from the health centre as compared to the male child. Women receiving advice about diarrhoea treatment during ANC visits (AOR 1.92, 95% CI 0.99-3.72) were 1.92 times more knowledgeable on how to treat diarrhoea than the women not receiving any advice about diarrhoea treatment during ANC. Women belong to Non-ST (AOR 1.88, 95% CI 1.15-3.09) were 1.88 times more likely to seek treatment for diarrhoea from health centre for a sick child as compared to the women belong to the scheduled tribes (ST). A women living in the urban area (AOR 2.80, 95% CI 1.53-5.12) were 2.80 times more likely to provide a better care to a sick child, and (AOR 2.41, 95% CI 1.64-3.53) were 2.41 times more likely to seek treatment for diarrhoea from health centre for a sick child as compared to women living in rural areas. Women living in Mizoram (AOR 0.05, 95% CI 0.01-0.25) were 95% lower in the odds of having knowledge about diarrhoea treatment and women living in

Nagaland (AOR 0.09, 95% CI 0.04-0.27) were 91% lower in the odds of seeking treatment for a sick child.

Table 4: Adjusted Odds Ratio (AOR) from logistic regression model examined the effect of selected demographic and Socio-economic characteristics on knowledge of diarrhoea and seeking treatment for diarrhoea morbidity.

Background Characteristics	Women Knowing how to treat diarrhea		Seeking Treatment for diarrhoea	
	Model 1	CI	Model 2	CI
Constant	5.1***	0.78-33.43	0.98	0.44-2.20
Sex of Child				
Male @			1	
Female			1.34**	0.99-1.80
Women age				
<20 years@				
20-29 years				
>29 years				
Women Education				
illiterate@	1			
primary	1.46	0.45-4.70		
secondary	3.38**	1.06-10.75		
above secondary	3.79***	0.81-17.63		
Wealth Quintile				
Poor @	1		1	
Middle	1.11	0.65-1.90	2.07*	1.43-2.99
Rich	3.21*	1.72-5.99	2.44*	1.65-3.60
Received advice on breastfeeding a child during diarrhoea				
No@	1			
Yes	1.92***	0.99-3.72		
Caste				
ST@	1		1	
Non ST	0.73	0.32-1.67	1.88**	1.15-3.09
Residence				
Rural@	1		1	
Urban	2.80*	1.53-5.12	2.41*	1.64-3.53
Religion				
Christian@	1		1	
Hindu	0.82	0.31-2.17	0.82	0.47-1.40
Buddhist	0.33**	0.12-0.94	0.64	0.35-1.17
Other	0.80	0.31-2.03	0.99	0.55-1.79
States				
Tripura@	1		1	
Sikkim	0.61	0.08-4.48	0.36**	0.14-0.92
Arunachal Pradesh	0.09*	0.02-0.43	0.37**	0.17-0.79
Nagaland	0.07*	0.01-0.37	0.09*	0.04-0.27
Manipur	0.50	0.09-2.58	0.22*	0.10-0.47
Mizoram	0.05*	0.01-0.25	0.35**	0.15-0.79
Meghalaya	0.14**	0.02-0.82	0.77	0.32-1.88
Total Observation	649		803	
Pseudo R2	0.21		0.09	

Note: @ Reference Category, * Significant at 1% level of significance, ** Significant at 5% level ofsignificance, ***Significant at 10% level of significance.

Determine the demographic and socio-economic factors which influencing women to give liquid food intake and administered HAF/ORS/Zinc to a sick child.

Based on the bivariate analysis of table 3, the variables with a p-value<0.05 were selected as predictor variables in the Mode 3, the variables are knowledge about diarrhoea treatment, health care seeking. Similarly, the variables with a p-value<0.05 selected as predictors variables in the Model 4 are women education, wealth quintile, residence, religion, states, knowledge about diarrhoea treatment and health care seeking. Table 5 shows that those women which are having knowledge about diarrhoea treatment (AOR 1.39, 95% CI 0.96-2.03) were 1.39 times more likely to give liquid food intake and (AOR 1.91, 95% CI 1.18-3.08) 1.91 times more likely to administered HAF/ORS/Zinc to a sick child as compared with women having no knowledge about diarrhea treatment. Comparing with the women belonging to the poor household, the women belong to wealthier household (AOR 2.18, 95% CI 1.32-3.59) were 2.18 times more likely to administered HAF/ORS/Zinc to a sick child, and women living in the urban area (AOR 1.54, 95% CI 0.97-2.45) were 1.54 times more likely to administered HAF/ORS/Zinc as compared to the women living in rural area. A women knowledge about diarrhoea treatment influences her to prefer the used of liquid food or administered HAF/ORS/Zinc. Women seeking treatment from government facilities (AOR 1.50, 95% CI 1.04-2.18) were 1.50 times more likely to give liquid food intake to a sick child as compared to women not seeking treatment outside the home, women seeking treatment from government and private health care were 4 times more likely to administered HAF/ORS/Zinc to a sick child from diarrhoea. For women living in Manipur (AOR 2.38, 95% CI 0.99-5.73) and Mizoram (AOR 2.39, 95% CI 0.97-5.89) the odds of administered HAF/ORS/Zinc are almost 2 times as compared to the women from Sikkim.

Table 5: Adjusted Odds Ratio (AOR) from logistic regression model examined the effect of selected demographic and Socio-economic characteristics on given liquid food to a child and HAF/ORS/Zinc.

Background Characteristics	Give Liquid food to a child during Diarrhoea		Administered HAF/ORS/Zinc	
	Model 3	**CI**	**Model 4**	**CI**
Constant	3.48*	1.44-8.41	0.10*	0.02-0.47
Women Education				
illiterate@			1	
primary			1.29	0.38-4.40
secondary			1.47	0.44-4.94
above secondary			2.52	0.61-10.37
Wealth Quintile				
Poor@			1	
Middle			1.1	0.68-1.70
Rich			2.18*	1.32-3.59
Residence				
Rural@			1	
Urban			1.54**	0.97-2.45
Religion				
Christian@			1	
Hindu			1.05	0.61-1.80
Buddhist			2.14***	0.90-5.08
Other			1.48	0.73-3.00
Knowledge about Diarrhoea Treatment				
No@	1		1	
Yes	1.39***	0.96-2.03	1.91*	1.18-3.08
Health Care Seeking				
Not Seeking care	1		1	
Government	1.50**	1.04-2.18	3.84*	2.53-5.80
Private	1.04	0.64-1.68	3.92*	2.18-7.04
States				
Sikkim@	1		1	
Arunachal Pradesh	0.34**	0.14-0.82	1.36	0.56-3.25
Nagaland	0.44	0.17-1.17	1.1	0.38-3.17
Manipur	0.58	0.24-1.41	2.38***	0.99-5.73
Mizoram	0.55	0.23-1.33	2.39***	0.97-5.89
Tripura	0.91	0.29-2.87	7.12*	2.13-23.79
Meghalaya	0.44	0.17-1.17	2.05	0.70-6.03
Total Observation	803		639	
Pseudo R2	0.026		0.16	

Note: @ Reference Category, * Significant at 1% level of significance, ** Significant at 5% level of significant and *** Significant at 10% level of significance.

DISCUSSION

Despite the cost of treatment of diarrhoea is low still, this disease contributes major death especially for children under five years of age. Our findings bring some light on some of the important issues about women knowledge and seeking treatment for a child suffering from diarrhoea. We found that most of the women are having knowledge about diarrhoea treatment but more than half of the women whose child is suffering from diarrhoea did not seek treatment from any healthcare facilities. A surprise finding is that most of the women prefer to give liquid food than to seek treatment or administered HAF/ORS/Zinc. Treatment for diarrhoea by giving liquid food or administered HAF/ORS/Zinc is high among the women seeking treatment Government and Private healthcare facilities, whereas women not seeking any treatment prefer to give liquid food instead of HAF/ORS/Zinc. It is found that those women who are having secondary or above the secondary level of education have more knowledge on how to treat a child suffering from diarrhoea. Similar finding conducted on Sedibeng, South Africa reported that women educational level has a significant positive correlation with attitude and knowledge of Oral Rehydration Therapy[11], and in contrast to the finding conducted in Iran where knowledge in managing diarrhoea is not related with the educational level of the women[1]. These findings reflect the importance of proper teaching of less educated women about the treatment methods for diarrhoea. Women belong to the rich household is significantly having more knowledge about diarrhoea treatment and they are more likely to seek treatment for diarrhoea from the health centre. A study in India found that poor economic status of the household is the barrier for seeking treatment from the health centre, children belong to the wealthier household had a higher chance of being taken to health care facilities[7]. This may be the reason that women from the wealthier household may have more exposure to media and information technology like internet, television, mobile phone etc as compared to poor women who were unable to access to these facilities because of poverty. The study also finds a gender bias against a boy child in seeking treatment for diarrhoea. In Northeast India, daughter is not treated as liabilities and the dowry system in the region generally does not exist. In fact, Arunachal Pradesh and Meghalaya being the two matriarchal states are located in Northeast India[17] but the result is in contrast with the study in India[9]. Our results also show that during ANC visit if a woman does not receive any advice or information about breastfeeding a child during diarrhoea then the women will have less knowledge about diarrhoea treatment as compared to women receiving advice about breastfeeding. A study in Western Ethiopia suggested that there is an association between

knowledge of women about cause, transmission and prevention of diarrhoeal disease and prevalence of diarrhoea[16].Women living in the urban area have more knowledge about diarrhoea treatment and prefer to seek treatment for diarrhoea treatment. In an urban area, easy access to the health centre with the availability of better facilities from the government or private providers influence woman for seeking diarrhoea treatment for a sick child, where mostly it is not the case in the rural area[9]. Also, we found that women from states like Arunachal Pradesh, Nagaland, Mizoram and Meghalaya are having less knowledge about diarrhoea treatment as compared with women living in Tripura. It has been found that women educational level influences knowledge about diarrhoea treatment and Tripura being the states with highest literacy rate among the Northeastern states may be the factors which influence women knowledge about diarrhoea treatment[26].

CONCLUSION

Wealth quintile shows a significant association with women knowledge on treatment of diarrhoea and seeking treatment. Education of women is also an important factor as observed through the study and women advice about diarrhoea management from health workers is an important role in bringing down the prevalence of diarrhoea. More awareness about the causes of diarrhoea and treatment of disease need to focus on illiterate women in Northeast India, health workers need to put effort on informing the women about the causes leads to diarrhoea and the need of clean hygienic practices. Treated a sick child from diarrhoea by giving Zinc tablet or ORS is the recommended treatment from the WHO, our findings show that illiterate women are less likely to treat a child using Zinc or ORS, health authorities and NGO's need to increase the awareness about this type of treatment.

APPENDIX

Table 5: Percentage of Children under five years suffering from diarrhoea two weeks prior the survey by type of diarrhoea management practices and by the source of care.

States	Knowledge	Seeking	Give Liquid Food			HAF/ORS/Zinc		
			No Care	Government	Private	No Care	Government	Private
Sikkkim	93.62	56.52	95.65	95.65	100	40.91	69.57	100
Arunachal Pradesh	73.54	48.66	77.67	89.55	52.63	31.68	74.63	47.37
Nagaland	73.13	31.34	87.04	83.33	100	22.22	66.67	71.43
Manipur	92.77	59.51	85.15	89.74	84.62	51.52	71.05	76
Mizoram	60.63	58.37	88.14	95.83	96.77	44.83	70.83	77.42
Tripura	95.65	87.5	85.71	100	100	69.23	92.86	100
Meghalaya	79.1	64.62	85.19	92.31	78.57	29.63	95.83	78.57

Table 6: Distribution of Study Population in term of Socio-economic characteristics.

Background Characteristics	N=803 (%)
Sex of Child	
Male	433 (53.92)
Female	370 (46.08)
Age of Child	
<6 months	63 (7.85)
6-11 months	119 (14.82)
12-23 months	202 (25.16)
> 23 months	419 (52.18)
Women age	
<20 years	36 (4.48)
20-29 years	482 (60.02)
>29 years	285 (35.49)
Women Education	
illiterate	15 (2.31)
primary	175 (26.96)
secondary	406 (62.56)
above secondary	53 (8.17)
Wealth Quintile	
Poor	285 (35.49)
Middle	278 (34.62)
Rich	240 (29.89)
Caste	
ST	592 (73.72)
Non-ST	211 (26.28)
Residence	
Rural	630 (78.46)
Urban	173 (21.54)
Religion	
Christian	457 (56.91)
Hindu	194 (24.16)
Buddhist	75 (9.34)
Other	77 (9.59)

REFERENCES

1. Ghasemi, A. A., Talebian, A., Alavi, N. M., & Mousavi, G. A. (2013). Knowledge of womens in management of diarrhoea in under-five children, in kashan, Iran. Nursing and Midwifery Studies, 1(3), 158-62.

2. Mukhtar, A., Izham, M. I. M., & Pathiyil, R. S. (2011). A survey of womens' knowledge about childhood diarrhoea and its management among a marginalised community of Morang, Nepal. The Australasian medical journal, 4(9), 474

3. United Nation Children's Emergency Fund (UNICEF), Monitoring the Situation of Children and Women 2015, New York/Geneva Available from:http://data.unicef.org/child-health/diarrhoeal-disease.html Access on 15 March 2016.

4. International Institute for Population Sciences (IIPS) and Macro International. 2007. *National Family Health Survey (NFHS-3), 2005–06: India: Volume I*. Mumbai: IIPS.

5. Office of the Registrar General, India (200), Report on Cause of Death in India (2004-06), Ministry of Home Affairs, New Delhi. Available from http://www.censusindia.gov.in/vital_statistics/consolidated_DATA_2004-6_FINAL.pdf. Access on 19 July 2017.

6. Pillai, R. K., Williams, S. V., Glick, H. A., Polsky, D., Berlin, J. A., & Lowe, R. A. (2003). Factors affecting decisions to seek treatment for sick children in Kerala, India. *Social science & medicine*, *57*(5), 783-790. Available from http://www.sciencedirect.com/science/article/pii/S0277953602004483. Access on 8 March 2016.

7. Malhotra, N., & Choy, N. (2010). Disparities in the Treatment of Childhood Diarrhoea in India. Available from:https://www.researchgate.net/publication/47802912_Disparities_in_the_Treatment_of_Childhood_Diarrhoea_in_India. Access on 2 March 2016.

8. Shah, M. S., Ahmad, A., Khalique, N., Khan, I. M., Ansari, M. A., & Khan, Z. (2011). Do the womens in rural Aligarh know about home based management of acute diarrhoea?. *Biol Med*, *3*, 76-80. Available on: http://www.jidc.org/index.php/journal/article/viewFile/22337842/678. Access on 15 March 2016.

9. Sreeramareddy, C. T., Sathyanarayana, T. N., & Kumar, H. H. (2012). Utilization of health care services for childhood morbidity and associated factors in India: a national cross-sectional household survey. *PloS one*,*7*(12), e51904. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0051904. Access on 16 March 2016.

10. Dengia,E.T. (2014). Women's perception and treatment seeking behavior for childhood diarrhoea in Dendi district, west Shoa, Ethiopia. *Global Journal of Medicine and Public Health*, 3(3). Available from http://www.gjmedph.org/uploads/O5-Vo3No3.pdf. Access on 17 March 2016.

11. Onwukwe, S., van Deventer, C., & Omole, O. (2015). Evaluation of the use of oral rehydration therapy in the management of diarrhoea among children under 5: knowledge

attitudes and practices of womens/caregivers. *South African Family Practice*, 1-6. Available from http://www.tandfonline.com/doi/pdf/10.1080/20786190.2015.1120933. Access on 7 March 2016.

12. Singh, K. D., Alagarajan, M., & Ladusingh, L. (2015). What Explains Child Malnutrition of Indigenous People of Northeast India?. *PloS one*, *10*(6), e0130567. Available on: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130567. Access on 9 March 2016.

13. International Institute for Population Science (IIPS), 2014.*District Level Household and Facility Survey (DLHS-4), 2012-13*: Mumbai: IIPS.

14. World Health Organization (WHO), 2006. Implementing the New Recommendations on the Clinical Management of Diarrhoea: Guidelines for Policy Makers and Programme Managers. Geneva: WHO. Available from: http://whqlibdoc.who.int/publications/2006/9241594217_eng.pdf. Accessed on 5 August 2016.

15. World Health Organization. (2005). The treatment of diarrhoea: a manual for physicians and other senior health workers. Geneva WHO.

16. Merga, N., & Alemayehu, T. (2015). Knowledge, perception, and management skills of womens with under-five children about diarrhoeal disease in indigenous and resettlement communities in Assosa District, Western Ethiopia. *Journal of health, population, and nutrition*, *33*(1), 20-30.

17. Ladusingh, L., & Singh, C. H. (2006). Place, community education, gender and child mortality in North-east India. *Population, Space and Place*, *12*(1), 65-76.

18. United NationChildren's Fund (UNICEF), 2013. *Committing to child survival: A Promise Renewed*. New York.

19. The UN Inter-Agency Group for Child Mortality Estimation. Levels and trends in child mortality: report 2015. New York: UNICEF, 2015.

20. International Institute for Population Science (IIPS).*National Family Health Survey (NFHS-4), 2015-2016: India Fact Sheet*.Mumbai:IIPS.

21. Rao, K. V., Mishra, V. K., & Retherford, R. D. (1998). Knowledge and use of oral rehydration therapy for childhood diarrhoea in India: effects of exposure to mass media.

22. Kannan, M. (2016). The Chicken's Neck Conspiracy-An Analysis. *Imperial Journal of Interdisciplinary Research*, *2*(11).

23. Sundararajan, R., Kalkonde, Y., Gokhale, C., Greenough, P. G., & Bang, A. (2013). Barriers to malaria control among marginalized tribal communities: a qualitative study. *PloS one*, *8*(12), e81966.

24. Narzary, P. K. (2015). Usual Source of Treatment in Northeast India. *The Indonesian Journal of Geography*, *47*(1), 52.

25. International Institute for Population Science (IIPS), 2012. *District Level Household Survey (DLHS-4), 2012-13Interviewer's Manual*: Mumbai: IIPS.

26. Government of Tripura (n.d). *Literacy Statistics 2016*. Available from http://schooleducation.tripura.gov.in/sites/default/files/Literacy%20Statistic%2020161.pdf. Access on 7 Sept 2017.