Low maternal education and socioeconomic status were associated with household food insecurity in children under five with diarrhoea in Bangladesh.

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Published in:
Acta paediatrica

DOI:
10.1111/apa.13325

2016

Document Version:
Peer reviewed version (aka post-print)

Title: Prevalence and determinants of household food insecurity in children under five with diarrhoea in Bangladesh

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Short title: Household food insecurity and diarrhoea

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ABSTRACT

Aim

To examine the prevalence and determinants of household food insecurity (HFI) in children under five who experienced diarrhoea during a two-week period in Bangladesh.

Methods

A total of 365 children (55% boys) who experienced diarrhoea in the two-week prior to the 2011 Bangladesh Demographic Health Survey (BDHS-2011) were included in this study. The Household Food Insecurity Access Scale (HFIAS) was used to asses HFI. Pearson's chi-square test and binary logistic regression analysis were used to investigate the association between HFI and multilevel factors.

Results

The prevalence of HFI was 48% among the children under five who experienced diarrhoea in the two-week prior to the BDHS-2011 survey. It was significantly higher among the children of uneducated mothers and children who were from lowest socioeconomic status (SES) families. The children of uneducated mothers were two times more likely to experience HFI (adjusted Odds Ratio [OR] 2.14, 95% confidence interval [CI] 1.09-4.22) and children from families with very low SES were over seven times more likely to experience HFI (adjusted OR 7.55, 95% CI 2.10-27.11).

Conclusion

Low maternal education and low SES status were significantly associated with HFI in the children under five with diarrhoea in Bangladesh. Targeted multifocal interventions should be implemented to address contributing factors to relieve the burden of this public health issue.

Key words: Bangladesh, children, diarrhoea, household food insecurity, nutrition.

Key notes:

- Current study included children under five who experienced diarrhoea during a two-week period from a nationwide sample in Bangladesh.
- Low maternal education and low socioeconomic status were significantly associated with household food insecurity (HFI) among the Bangladeshi children under five who experienced diarrhoea.
- These findings have important implications for developing effective interventions to address contributing factors to HFI in Bangladesh.

INTRODUCTION

Household food insecurity (HFI) is defined as insufficient access to nutritionally safe and adequate foodstuffs that are required to meet the dietary needs for an active and healthy life (1,2) and it is a cause of hunger and malnutrition globally. In Bangladesh, approximately 30% of the population lives below the poverty line (3) and one in four Bangladeshi households experience food insecurity. Many factors contribute to HFI, including regional (e.g. region of residence, place of residence), household socioeconomic status (SES) and factors relating to the individual (e.g. age, education) (4).

Approximately 50% of all Bangladeshi children age 6-24 months do not receive the minimum meal frequency (≥3 meals per day) (2). Consequently, the prevalence of malnutrition among children under five in Bangladesh was 41% in 2007, one of the highest in the world (5). Children in families that experience severe HFI, especially street children, eat unsafe or unhygienic foods, often collected from dustbins or street vendors, which are likely to cause

numerous health hazards including diarrhoea (6). Evidence shows that HFI is associated with malnutrition, which contributes to adverse health and development outcomes (7). Therefore, it can be postulated that children growing up in food insecure households are more susceptible to diseases such as diarrhoea, anaemia and malnutrition which can adversely affect long term economic, social and political development of a country (8).

Multilevel studies pertaining to low-income countries outlined the relationship between HFI and multilevel factors among children without specific foodborne illnesses (9,10). However, there are no studies available from Bangladesh that explores the relationship between HFI and multilevel factors among children under five with diarrhoea using a nationally representative sample. Considering the limited number of studies, generalizability of the evidence is restricted and context specific. Therefore, it is essential to establish the comprehensive relationship between HFI and multilevel factors that affect children under five who had diarrhoea to inform policy in Bangladesh. This study therefore aims to address the gap of this knowledge by: estimating the prevalence of HFI among children under five who had diarrhoea (an episode of diarrhoea in the two-week prior to a survey), and identifying the association between HFI and individual, household and community level factors.

METHODS

Data investigated was obtained from a nationally representative survey, namely the 2011 Bangladesh Demographic Health Survey (BDHS-2011). The BDHS-2011 survey data was collected using a cross-sectional survey method, between 8 July and 27 December 2011 inclusive. The survey covered seven administrative regions (divisions): Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur and Sylhet which included both rural and urban areas. On average, 120 households were selected from each Primary Sampling Units (PSUs), using an

equal probability systematic sampling technique. Details of sampling design and protocol used in the BDHS 2011 can be found within the MEASURE DHS (11).

Sample size

A total of 8,761 children under five years of age were considered for anthropometric measurements and data were obtained for 7,647 children (around 88%). Of this cohort of children, children who experienced an episode of diarrhoea in the two weeks before the survey (n=365) were included in the current study. Accordingly, the study sample consisted of 365 children (55% boys) with a mean age of 25.08 (±15.77) months.

Outcomes

Five household food security indicators were selected using the Household Food Insecurity Access Scale (HFIAS) and included in the questionnaire for women, which was answered by mothers of the children included in the BDHS-2011 survey (12). The technical working group of the BDHS-2011 (11) systematically reviewed and modified the indicators used in the HFIAS to ensure that the included indicators were relevant and specific to Bangladesh. Participants were asked five questions about their food intake in the last 12 months: 1. how often they had three-square (full stomach) meals a day; 2. whether they skipped entire meals because there was not enough food; 3. whether they had less food in a meal because there was insufficient food; 4. if she or any of her family members ate wheat or another grain in place of rice, and 5. if they asked for food from relatives or neighbours to make a meal. Each indicator had four response options: 1. Never, 2. rarely (1-6 times in the past 12 months), 3.sometimes (7-12 times in the past 12 months), and 4.often (few times each month). A household was classified food insecure if the respondent answer sometimes, often, or never to question one and was answered rarely, sometimes, or often to questions two to five. A household that did not meet these conditions (i.e. scoring 0) was classified as food secure. Individual food

frequency scores for all the five frequency responses were summed in a single food security score for each woman in the household who is married. To facilitate analysis, a composite score ranging from a minimum of zero to a maximum of 15 was calculated and classified as a dichotomous score - food secure (0) and food insecure (>0) (13).

Covariates

Three levels of characteristics (i.e. individual, household, and community) were included in this study. Individual level characteristics were child's age; child's sex (male, female); child's birth order (first, second, third, fourth and above); mother's perception of child birth size (large, average, small); currently breastfeeding (no, yes); child stunted (no, yes); child wasted (no, yes); child underweight (no, yes); mother's education (no education, primary, secondary or more); place of residence (urban, rural) and father's education (no education, primary, secondary or more). A child was considered stunted, wasted and underweight respectively if the height-for-age, weight-for-height or weight-for-age indices were more than two standard deviations below their respective median of World Health Organization (WHO) reference population (11). Household SES was constructed using the wealth index (poorest, poorer, middle, richer, and richest) (11). SES of community was estimated by averaging the household wealth index as poor, average and rich (14).

Statistical analysis

Descriptive statistics were presented as mean and percentages for HFI, individual, household and community level characteristics. Chi-square test and binary logistic regression were used to evaluate the association between outcome and independent variables (covariates). Logistic regression was investigated for multicollinearity. The regression coefficient standard error (SE) was <0.10 for the independent variables, namely HFI, and the results indicate an absence of multicollinearity. SE>2.0 indicates numerical problems (15). Stata version 11.2/SE (Stata

Corp, College Station, Texas, USA) was used for all statistical analysis. All analyses were statistically significant at 5% level.

RESULTS

Among the children who experienced an episode of diarrhoea in the two-weeks prior to the BDHS-2011 survey, 22.74% were being breastfed at the time of data collection. Of the cohort of children studied, 44.93% were stunted, 19.73% were wasted and 43.29% were underweight. The sociodemographic profiles of the children are shown in Table 1.

Prevalence of HFI

Table 2 highlights the prevalence of HFI among children under five who experienced an episode of diarrhoea in the two-week before data collection. HFI was estimated to be 48% among children under five who experienced an episode of diarrhoea in the two-week before data collection. The prevalence of HFI was 35.3 % among the children who did not have diarrhoea (data not shown).

Association between HFI and covariates

Variables found to be significant in bivariate analyses were included in the binary logistic regression analyses (Table 3). In the unadjusted model, all the selected variables had significant effects on HFI except fourth and above birth order. The model was adjusted for selected factors such as birth order of the child, level of stunting, parent's education, SES, community status, and type of toilet facilities. In the adjusted model, children of mothers with no formal education were twice as likely to experience HFI compared with mother with formal education (i.e. primary, secondary or more). Children from socioeconomically disadvantaged families were over seven times more vulnerable to HFI than children from the highest SES families.

DISCUSSION

The current study indicated a high prevalence (48%) of HFI among children under five who experienced diarrhoea in Bangladesh. The prevalence of HFI among children under five who experienced diarrhoea has not been well documented across low-income countries therefore comparative analysis was unavailable. According to the BDHS report in 2011, 35.9% children under five were food insecure (13). Data for other low and middle income countries show a higher level of HFI than Bangladesh. For example, the prevalence of HFI is 69.9% in Ghana, 66.4% in Ethiopia, 40.3% in Vietnam and 69% in Nepal (16-18). It could be hypothesized that an increase in the global foods prices of more than 10%; social and political instability and environmental vulnerability may have adversely affected food and nutrition security, especially in low-income countries (19).

The current study found a marginally significant ($p=0.054$) relationship between the HFI and younger children who were currently being breastfeed. Similar results were observed among children age 12-24 months in Brazil (20). Previously no studies have substantially addressed the relationship between the HFI and birth order among children under five who have experienced diarrhoea. However, a study of adolescents in Iran found a significant association between HFI and birth order (21). The prevalence of HFI was also significantly higher among stunted children and consistent with the findings reported in previous studies from Bangladesh, Ethiopia and Nepal (7,10,13). High prevalence of stunting appears to be due to reduced nutritional intake as a result of inadequate food consumption caused by HFI. For example, in Bangladesh the childhood malnutrition is high due to feeding children inadequate, inappropriate and contaminated food resulting in faltered growth, development and illness (e.g. diarrhoea) in children (22,23). However, the present study did not show any significant association between HFI and wasting and/or being underweight. This might suggest that the

malnutrition in the children under five (who experienced diarrhoea two-week prior to BDHS-2011 survey) has no independent effect on HFI.

In this case, the findings indicate that low maternal education and SES, regardless of the nutritional status of children (i.e. wasting, stunting and underweight) exert a significant effect on HFI among these children. The findings were consistent with other studies from low-income countries such as Nepal and Ghana, where the prevalence of HFI was significantly higher among children of uneducated parents and lowest SES (1,10). Families from low SES communities are less likely to have the financial resources to buy nutritious foodstuff or enough food for the family. It is widely established that higher prevalence of malnutrition found in areas with chronic widespread poverty (34) and a large proportion of children from low SES households are food insecure (24,25). For example, 15% to 79% of households in the marginalized populations in Tanzania, Ethiopia, Bangladesh and Myanmar are too poor to feed their children a healthy diet causing severe malnutrition (26). Additionally in Nepal and Ghana, children of less educated mothers were from food insecure households (1,10). Similar results have been observed in Organization for Economic Co-operation and Development (OECD) countries, such as Unites States, households with uneducated mothers are vulnerable for HFI (9).

Identifying multilevel determinants of HFI among children under five who had diarrhoea, using national data has not been substantially studied for the low income countries prior to this study. The current study, logistic regression analysis adjusted for multilevel factors showed that poor level of mother's education and low SES strongly influenced HFI. In India, education had significant impact on HFI which was consistent with our study (27). In New Zealand, SES was found to have significant effect on HFI, although, education was not significantly associated with the HFI in New Zealand (28).

Food insecurity can be tackled by food subsidy programs, which normally promote price reductions and improve food availability and access (4). To effectively change nutrition, health, and food security status, adequate surveillance programs are required at a government and non-governmental level (29). The data collected would indicate a need to empower and educate women in Bangladesh (30). It is recommended that effective food safety net program should be developed and extended in targeted areas where child malnutrition, child illness and HFI are most prevalent (29).

Strengths and limitations

The current study had several strengths and limitations. The main strength identified was the investigation of the pervasive relationship between multilevel factors and HFI among children who experienced diarrhoea (two-week prior to the BDHS survey) in Bangladesh, using a large nationally representative data source (BDHS) in 2011. Current study is representative of Bangladesh, thus the results of this study can be safely generalized to similar populations, contexts and settings. The study did not consider some aspects which may have a bearing on HFI (e.g. quality of the food consumed, food preference, gender discrimination in food allocation and access to health care). Therefore, further studies considering the aforementioned factors are recommended. A further limitation is that no comparison group is included (i.e. children who had not had diarrhoea in the recent past). Thus, it is difficult to interpret the significance of the relationship and if diarrhoea is a significant marker of increased risk for HFI. The cross-sectional nature of the data means that it was not possible to assess cause and effect relationship between selected factors and HFI. Another limitation involves recall bias, which may result from mother's self-reporting of age, education, household assets and birth size etc. Despite these limitations, current study has been able to draw a detailed picture on the association between HFI and multilevel factors among the children under five who experienced diarrhoea in Bangladesh.

CONCLUSION

The findings of our study suggest that low maternal education and low SES, regardless of the nutritional status of children are significantly associated with HFI in children under five who experienced diarrhoea. The implications of this study are critical for governmental and non-governmental organizations to develop effective strategies/interventions for improved maternal education, together with overall socioeconomic wellbeing of families to improve the HFI status. Furthermore, investigations into factors contributing to and effects of, HFI are needed. For example, longitudinal studies that can assess the cause-effect relationships as well as studies from a matched cohort, which will inspire ingenuity in developing effective strategies to improve the HFI status of children who experience severe illness.

Conflicts of interest: None

Statement and finance statement: None

References

1. Saaka M, Osman SM. Does Household Food Insecurity Affect the Nutritional Status of Preschool Children Aged 6–36 Months? *International Journal of Population Research* 2013; 2013:12.
2. Schneider K, Roy PK, Hasan D. Food insecurity and child malnutrition in North Bangladesh, 2009. [Cited 2015 November 6]. Available from URL:http://www.ennonline.net/fex/36/food
3. Hossain Khan M. Urban health in megacities of developing countries. *Public Health Forum* 2012; 20:29.e1-.e3.
4. Sambu WC. Household food security and the anthropometric status of children under five: evidence from the Kenya integrated household budget survey (2005/2006). *The*

Institute for Social Development, Faculty of Economic and Management Sciences, University of the Western Cape, 2013

5. Ahmed T, Mahfuz M, Ireen S, Ahmed AM, Rahman S, Islam MM, et al. Nutrition of children and women in Bangladesh: trends and directions for the future. *J Health Popul Nutr* 2012; 30:1-11.
6. Ahmed KS, Uddin MM, Islam S, HuqMN, Nehar S, Nessa Z, et al. A baseline survey of street children in Bangladesh. *The Bangladesh Bureau of Statistics National Child-Labour Survey, 2002 –2003*
7. Belachew T, Lindstrom D, Hadley C, Gebremariam A, Kasahun W, Kolsteren P. Food insecurity and linear growth of adolescents in Jimma Zone, Southwest Ethiopia. *Nutr J* 2013; 12:55.
8. Melchior M, Chastang JF, Falissard B, Galera C, Tremblay RE, Cote SM, et al. Food insecurity and children's mental health: a prospective birth cohort study. *PLoS One* 2012; 7:e52615.
9. Gross RS, Mendelsohn AL, Fierman AH, Racine AD, Messito MJ. Food insecurity and obesogenic maternal infant feeding styles and practices in low-income families. *Pediatrics* 2012; 130:254-61.
10. Osei A, Pandey P, Spiro D, Nielson J, Shrestha R, Talukder Z, et al. Household food insecurity and nutritional status of children aged 6 to 23 months in Kailali District of Nepal. *Food & Nutrition Bulletin* 2010; 31:483-94.
11. National Institute of Population Research and Training MaA, ICF International,,. Bangladesh Demographic and Health Survey 2011. *Dhaka, Bangladesh: National Institute of Population Research and Training, Mitra and Associates, ICF International; 2013*

12. Coates J, Anne S, Paula B. Household Food Insecurity Scale (HFIAS) for Measurement of Food Access: Indicator Guide. Food and Nutrition Technical Assistance (FANTA). Version 3. Washington, DC: Academy of Educational, 2007. [Cited 2015 November 07]. Available from URL:http://www.fantaproject.org/downloads/pdfs/HFIAS_v3_Aug07.pdf.
13. Hasan MM, Ahmed S, Chowdhury MAH. Food Insecurity and Child Undernutrition: Evidence from BDHS 2011. *Journal of Food Security* 2013; 1:52-7.
14. Rahman MM, Gilmour S, Akter S, Abe SK, Saito E, Shibuya K. Prevalence and control of hypertension in Bangladesh: a multilevel analysis of a nationwide population-based survey. *J Hypertens* 2015; 33:465-72; discussion 72.
15. Chan YH. Biostatistics 202: logistic regression analysis. Singapore Med J 2004; 45:149-53. Household Food Insecurity Scale (HFIAS)
16. Osei AK, Pandey PR, Spiro D, Nielson JN, Locks LM, Adhikari D. Household food insecurity is prevalent and predicts stunting among preschool children and anemia among mothers, in Baitadi district of Nepal.
17. Saaka M, Osman SM. Does Household Food Insecurity Affect the Nutritional Status of Preschool Children Aged 6-36 Months? *International Journal of Population Research* 2013; 2013:12.
18. Ali D, Saha KK, Nguyen PH, Diressie MT, Ruel MT, Menon P, et al. Household food insecurity is associated with higher child undernutrition in Bangladesh, Ethiopia, and Vietnam, but the effect is not mediated by child dietary diversity. *J Nutr* 2013; 143:2015-21.
19. World Bank. Food Security in South Asia. IBRD, IDA, The World Bank, 2012. [Cited 2015 November 07]. Available from URL:http://www.worldbank.org/en/news/feature/2012/10/22/food-security-south-asia

20. Gomes GP, Gubert MB. Breastfeeding in children under 2 years old and household food and nutrition security status. *J Pediatr (Rio J)* 2012; 88:279-82.

21. Mohammadzadeh A, Dorosty Motlagh A, Eshraghian M. The association of food security with socio-economic factors and weight status among adolescents. *Iranian Journal of Nutrition Sciences & Food Technology* 2010; 5:55-62

22. Senarath U, Dibley MJ. Complementary feeding practices in South Asia: analyses of recent national survey data by the South Asia Infant Feeding Research Network. *Matern Child Nutr* 2012; 8 Suppl 1:5-10.

23. Menon P. The crisis of poor complementary feeding in South Asia: where next? *Matern Child Nutr* 2012; 8 Suppl 1:1-4.

24. Matheson DM, Varady J, Varady A, Killen JD. Household food security and nutritional status of Hispanic children in the fifth grade. *Am J Clin Nutr* 2002; 76:210-7.

25. Rose D. Economic determinants and dietary consequences of food insecurity in the United States. *J Nutr* 1999; 129:517s-20s.

26. Save the Children UK. Running on Empty: Poverty and child malnutrition, 2007. [Cited 2015 November 08]. Available from URL:http://www.savethechildren.org.uk/resources/online-library/running-on-empty-poverty-and-child-malnutrition

27. Chinnakali P, Upadhyay RP, Shokeen D, Singh K, Kaur M, Singh AK, et al. Prevalence of household-level food insecurity and its determinants in an urban resettlement colony in north India. *J Health Popul Nutr* 2014; 32:227-36.

28. Carter KN, Lanumata T, Kruse K, Gorton D. What are the determinants of food insecurity in New Zealand and does this differ for males and females? *Aust N Z J Public Health* 2010; 34:602-8.

29. UNICEF. Child malnutrition and household food insecurity remain major concerns for Bangladesh, 2009. [Cited 2015 November 07]. Available from URL:http://www.unicef.org/media/media_48981.html

30. Sharma A, Kader M. Effect of Women's Decision-Making Autonomy on Infant's Birth Weight in Rural Bangladesh. ISRN Pediatr 2013; 2013:159542.

Table 1 Background profile of the children under-five with diarrhea (two weeks period prior to BDHS-2011 survey)

Characteristics	Number, n (%)
Individual level Characteristics	
Age (in months)	
0-11	90 (24.66)
12-23	107 (29.32)
24-35	64 (17.53)
36-47	58 (15.89)
48-56	46 (12.60)
Sex of child	
Boys	201 (55.07)
Girls	164 (44.93)
Child birth order	
First	127 (34.79)
Second	99 (27.12)
Third	67 (18.36)
Forth and above	72 (19.73)
Mother's perception of child birth size	
Large	53 (14.52)
Average	239 (65.48)
Small	73 (20.00)
Currently breastfeeding	
Yes	282 (77.26)
No	83 (22.74)
Child stunted	
No	201 (55.07)
Yes	164 (44.93)
Child wasted	
No	293 (80.27)
Yes	72 (19.73)
Child underweight	
No	207 (56.71)
Yes	158 (43.29)
Mother's education	
No education	68 (18.63)
Education	297 (81.37)
Father's education	
No education	123 (33.70)
Education	242 (66.30)
Household level characteristics	
Socio-economic status	
Poorest	85 (23.29)
Poorer	72 (19.73)
Middle	88 (24.11)
Richer	57 (15.62)
Richest	63 (17.26)
Source of water	
Piped water	27 (7.40)
Tubwell	286 (78.36)
Others	52 (14.25)
Type of toilet facilities	
Flushed	39 (10.68)
Pit latrine	125 (34.25)
Others	201 (55.07)
Community level characteristics	
Place of residence	
Urban	100 (27.40)
Rural	265 (72.60)
Community status	
Poor	110 (30.14)
Middle	113 (30.96)
Rich	142 (38.90)
Total	365 (100.00)

Table 2 Prevalence of household food insecurity among the children (two weeks period prior to BDHS-2011 survey) from bivariate analysis

Characteristics	Number (n)	Prevalence (95% CI)	P-value[†]
Age (in months)			
0-11	41	50.2 (38.7-61.8)	0.616
12-23	44	43.6 (33.1-54.6)	
24-35	50	50.9 (36.7-65.0)	
36-47	32	55.3 (41.0-68.7)	
48-56	18	41.0 (25.8-58.1)	
Sex of child			
Male	93	47.0 (39.2-55.0)	0.727
Female	72	49.2 (39.6-58.9)	
Child birth order			
First	41	32.6 (24.3-42.1)	0.001
Second	45	46.7 (36.2-57.5)	
Third	34	57.1 (43.1-70.1)	
Forth and above	45	64.5 (50.6-76.3)	
Mother's perception of child birth size			
Large	23	48.2 (31.1-65.6)	0.993
Average	107	47.8 (40.8-54.8)	
Small	35	48.6 (35.7-61.7)	
Currently breastfeeding			
Yes	127	48.0 (41.1-54.9)	0.981
No	38	48.1 (35.1-61.5)	
Child stunted			
No	77	41.6 (33.5-50.1)	0.025
Yes	88	55.1 (46.2-63.7)	
Child wasted			
No	135	49.4 (42.3-56.5)	0.347
Yes	30	42.3 (30.0-55.6)	
Child underweight			
No	84	45.4 (37.2-53.9)	0.338
Yes	81	51.2 (42.3-60.1)	
Mother's education			
No education	47	70.9 (57.7-81.3)	0.001
Education	118	42.7 (36.3-49.5)	
Father's education			
No education	71	62.9 (51.8-72.8)	0.001
Education	94	39.0 (31.8-46.7)	
Socio-economic status			
Poorest	60	74.8 (64.0-83.2)	<0.001
Poorer	42	56.6 (43.4-69.0)	
Middle	34	37.0 (25.7-49.8)	
Richer	19	34.5 (21.5-50.2)	
Richest	10	18.1 (8.5-34.4)	
Source of water			
Piped water	10	37.0 (16.2-64.2)	0.633
Tubwell	133	49.1 (42.4-55.8)	
Others	165	46.1 (31.2-54.3)	
Type of toilet facilities			
Flushed	8	28.0 (13.0-50.3)	0.014
Pit latrine	51	41.1 (32.4-50.4)	
Others	106	55.2 (46.6-63.5)	
Place of residence			
Urban	42	41.3 (28.8-55.1)	0.303
Rural	123	49.4 (42.3-56.4)	
Community status			
Poor	75	69.7 (60.7-77.3)	<0.001
Middle	45	39.1 (28.4-51.0)	
Rich	45	33.4 (23.5-45.0)	
Total	165	48.0 (41.7-54.3)	

Note: CI- Confidence Interval; [†]P-values are of Pearson's chi-square tests

Table 3 Individual, household and community level of factors associated with household food insecurity among the children (two weeks period prior to BDHS-2011 survey) from logistic regression analyses

Characteristics	Unadjusted OR (95% CI)	P values	Adjusted OR† (95% CI)	P-values
Child birth order				
First	0.23 (0.16-0.52)	<0.001	0.51 (0.25-1.01)	0.054
Second	0.50 (0.26-0.93)	0.028	0.83(0.41-1.66)	0.595
Third	0.62 (0.31-1.21)	0.163	0.76 (0.38-1.55)	0.455
Forth and above	1.00		1.00	
Child stunted				
No	1.00		1.00	
Yes	1.86 (1.23-2.83)	0.004	1.33 (0.82-2.14)	0.244
Mother's education				
No education	3.39 (1.93-5.97)	<0.001	2.14 (1.09-4.22)	0.028
Education	1.00		1.00	
Father's education				
No education	0.47 (0.29-0.72)	0.001	0.94 (0.55-1.59)	0.810
Education	1.00		1.00	
Socio-economic status				
Poorest	12.72 (5.59-28.91)	<0.001	7.55 (2.10-27.11)	0.002
Poorer	7.42 (3.26-16.88)	<0.001	6.29 (1.97-20.13)	0.002
Middle	3.34 (1.49-7.43)	0.003	3.48 (1.14-10.69)	0.029
Richer	2.65 (1.11-6.34)	0.028	2.68 (1.07-6.69)	0.034
Richest	1.00		1.00	
Type of toilet facilities				
Flushed	1.00		1.00	
Pit latrine	2.67 (1.14-6.28)	0.024	0.99 (0.38-2.59)	0.988
Others	4.32 (1.89-9.87)	0.001	1.21 (0.44-3.29)	0.708
Community status				
Poor	0.31 (0.18-0.53)	<.0.001	1.14 (0.47-2.72)	0.773
Middle	0.22 (0.13-0.37)	<0.001	0.60 (0.28-1.29)	0.192
Rich	1.00		1.00	

Note: CI- Confidence Interval, OR- Odds Ratio; †Adjusted for all the other variables shown in the table