

FACTORS ASSOCIATED WITH DIARRHEA AMONG CHILDREN LESS THAN 5 YEARS OLD IN THAILAND: A SECONDARY ANALYSIS OF THAILAND MULTIPLE INDICATOR CLUSTER SURVEY 2006

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ABSTRACT : This study examined factors associated with diarrhea among children aged less than 5 years in Thailand, using data from the Multiple Indicator Cluster Survey (MICS) conducted from December 2005 to February 2006. Data were collected for 9444 children with 9409 children who had complete data on age being included in the analysis. Bivariate analysis was done using Pearson's Chi square test with multivariate analysis being done using binary logistic regression. The study found increased risk of diarrhea among children in households with one child under 5 years, with Thai heads, male and those with elderly or teenage caretakers. The highest risk of diarrhea was in children aged 6-23 months. Household wealth index quintile was also associated with diarrhea with children in the poor, middle and fourth wealth index quintiles being at increased risk of diarrhea compared to children in the richest wealth index quintile. Unsafe disposal of child's feces and weaning were associated with increased risk of diarrhea in children aged less than 2 years. Continued efforts to promote recommended child feeding practices, providing health education on hygienic practices in child care to targeted populations and targeting teenage and elderly caretakers in diarrhea prevention efforts in children are recommended.

Keywords: risk factors, multiple indicator cluster survey

INTRODUCTION: Diarrhea is a major cause of morbidity and mortality among children aged less than 5 years and accounts for 18% of all the global infant deaths annually. Most of these deaths occur in developing countries. Under-nutrition is an underlying cause of 61 % of all annual diarrhea deaths globally¹. Three types of under nutrition can be distinguished in children: wasting or insufficient weight for height (acute under nutrition); stunting or insufficient height for age (chronic under nutrition); and underweight or insufficient weight for age which could be a result of either or both. There exists a significant association between malnutrition and diarrhea². Exclusive breastfeeding, complementary feeding and replacement feeding are three categories of child feeding practices. Exclusive breastfeeding refers to breastfeeding while giving no other food or liquid with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines. Complementary feeding refers to giving an infant food in addition to breast milk or infant formula, when either becomes insufficient to satisfy the infant's nutritional

requirements while replacement feeding is feeding a child who is not receiving any breast milk with a diet that provides all the nutrients the child needs until the child is fully fed on family foods³. Exclusive breastfeeding for the first 6 months of a child's life and continued feeding with nutritionally adequate and safe complementary foods while breastfeeding continues for up to 2 years of age or beyond is recommended by the United Nations Children's Fund (UNICEF) and the World Health Organization⁴. Exclusive breastfeeding has been shown to reduce infant malnutrition and mortality due to diarrhea⁵, whereas early weaning is associated with high incidence of diarrhea⁶. Maternal socio demographic factors have been associated with the risk of diarrhea in children. There is increased risk of diarrhea in children with young mothers⁶; those whose mothers have low education and those not being taken care of by their mothers⁷. Generally, low socioeconomic status of a household has been identified as a risk factor for diarrhea in children⁸. Demographic factors of a child which can play a role in the risk of diarrhea include age, immunization status,

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gender and birth weight^{6,7,9}). In Thailand, there is a high burden of both diarrhea morbidity and mortality among children aged less than 5 years compared to other age groups¹⁰) but limited information on risk factors of diarrhea in children at the national level is available. The published Thailand Multiple Indicator Cluster Survey (MICS) report¹¹) was based on limited analysis of collected data, leaving out a lot of useful information. In this study further analysis of the MICS data was done to further explore factors associated with diarrhea in children aged less than 5 years.

MATERIALS AND METHODS: The MICS, whose methodology is described elsewhere in detail¹¹) was conducted across Thailand by the National Statistics Office with support from UNICEF from December 2005 to February 2006. Data were collected for 9444 children aged less than 5 years. Three MICS Thailand data sets (women, children and individual household member data set) were obtained from UNICEF and merged so as to have variables of interest in one data set. Analysis was done using SPSS version 16 for 9409 children who had complete data on age. Variables were defined based on MICS¹²). Bivariate analysis was done using Pearson's Chi square test while multivariate analysis was done using binary logistic regression. Variables which had p values of less than 0.2 and applied to all children were included in multivariate analysis. Level of significance was set at 0.05.

RESULTS:

Bivariate analysis of factors associated with diarrhea in children less than 5 years old

Household socio-demographic factors:

Past 2 weeks prevalence of diarrhea among children aged less than 5 years was 8.2%. There was no statistically significant association between diarrhea in children and residence (rural or urban) and region of households; household's head education level; treatment of water to make it safe for drinking; main source of drinking water and kind of toilet facility (results not shown). There was

significant association between diarrhea and both ethnicity and language spoken by the head of the household. Diarrhea rate was higher in children of Thai speaking or Thai ethnic household heads than in children of non-Thai speaking or non-Thai ethnic household heads. There was a strong association between household wealth index quintiles and diarrhea in children. The highest diarrhea rate (9.8%) was among children from the poorest wealth index quintile while the lowest rate (6%) was in children from households with the richest wealth index quintile. Among children aged less than 3 years, child's feces disposal method was associated with diarrhea. About 12% of children whose households dispose off child feces unsafely reported diarrhea in the past two weeks compared to 9% among children whose household dispose of child feces safely. A significant association between the number of children aged less than 5 years in the household and diarrhea among children was demonstrated. The rate of diarrhea among children from households with one child under 5 years was 8.7% while the rate in children from households with more than one child under 5 years was 6.7%. Maternal/caretakers mean age was 33.7 years (SD 10.8) and was strongly associated with diarrhea in children. The rate of diarrhea was highest among children whose caretakers were aged more than 59 years (11.6%) and lowest (7.3%) in children whose care takers were aged 30-39 years (Table 1). Other caretaker's demographic factors (gender, marital status, children ever born and education level) had only non significant association with diarrhea in children and their results are not shown.

Children's factors: Male children were slightly more (51.6%) than female children. There was a significant association between child's gender and diarrhea among children. Diarrhea rate was higher in male (8.9%) than female children (7.4%). A strong association between child's age and diarrhea was observed.

Table 1 Association between household and caretakers' socio-demographic and factors and diarrhea in children less than 5 years old

Factor	Total N (%)	Diarrhea in the past 2 weeks N (%)		P value
		Yes	No	
Language of household head (N = 9409)				0.021
Thai	8459 (89.9)	708 (8.4)	7751 (91.6)	
Other Languages	950 (10.1)	59 (6.2)	891 (93.8)	
Ethnicity of household head (N = 9409)				0.026
Thai	9173 (97.5)	757 (8.3)	8416 (91.7)	
Others	236 (2.5)	10 (4.2)	226 (95.8)	
Household wealth index quintile (N = 9409)				<0.001
Poorest	1530 (16.3)	150 (9.8)	1380 (90.2)	
Second	1747 (18.6)	126 (7.2)	1621 (92.8)	
Middle	2111 (22.4)	194 (9.2)	1917 (90.8)	
Fourth	2147 (22.8)	185 (8.6)	1962 (91.3)	
Richest	1874 (19.9)	112 (6)	1762 (94)	
Child's feces disposal method (N = 5658)				0.001
Safe	3658 (64.7)	329 (9)	3329 (91)	
Unsafe	2000 (35.3)	237(11.8)	1763 (88.2)	
Children <5 years in the household (N = 9404)				0.002
1	7039 (74.8)	609 (8.7)	6430 (91.3)	
>1	2370 (25.2)	158 (6.7)	2212 (93.3)	
Care taker's age in years (N = 9409)				0.001
<20	385 (4.1)	42 (10.9)	343 (89.1)	
20-29	3463 (36.8)	277 (8)	3186 (92)	
30-39	3408 (36.2)	249 (7.3)	3159 (92.7)	
40-49	1172 (12.5)	88 (7.5)	1084 (92.5)	
50-59	713 (7.6)	80 (11.2)	633 (88.8)	
>59	268 (2.8)	31 (11.6)	237 (88.4)	

Children were nearly equally distributed in each 1 year age group. Diarrhea rate was higher among children aged 6-11 months (13.4%); and 12-23 months (12.8%). Majority (56.5%) of children aged less than two years were on replacement feeding. In these children, feeding practices had strong association with diarrhea. Diarrhea rate was higher among children receiving replacement feeding (13.2%) than in those being exclusively breastfed or receiving complementary feeding (8.3%) in Table 2. Results of nutritional status are not shown but considering height for age, 1.8% of children had z scores of less than -3 (severely stunted) while 9.7% had z scores of -3 to -2.01 (moderately stunted). As for weight for age, 0.6 % of children had a z scores below -3 (severely underweight) while 8.2% had z scores of between -3 and -2.01 (moderately underweight). As for the weight for height, 1.1% of children had z

scores of less than -3 (severely wasted) with 3.5 % having z scores of between -3 and -2.01 (moderately wasted). About 12% of children had a z score of more than 2 (overweight). There was no significant association between diarrhea and nutritional status among children (results not shown). Almost all children aged 15-59 months (98.2%) had received measles vaccination and the immunization status did not have an association with diarrhea (results not shown)

Multivariate analysis of factors associated with diarrhea in children aged less than 5 years

Multivariate analysis was done using binary logistic regression. While controlling for other variables, household head education level and drinking water source had statistically insignificant effects (results not shown). Children whose households were in the poorest and

middle wealth index quintiles were about 1.6 times more likely to develop diarrhea than those whose households were in the richest wealth index quintile. The association between ethnicity of household head and diarrhea in children was marginally significant with children of non Thai household heads being less likely to develop diarrhea than their counterparts with Thai household heads. The number of children under 5 years in the household was negatively associated with diarrhea. Caretaker's age had a significant positive association with diarrhea in children. Female children were 0.8 times more

likely to develop diarrhea than their male counterparts. Child's age had a strong association with diarrhea. Children aged 6-12 months were 4.3 times more likely to develop diarrhea than children aged 48-59 months while those aged less than 6 months were only 1.5 times more likely to develop diarrhea than those aged 48-59 months (Table 3) Feeding practices and child feces disposal method maintained significant association with diarrhea in children aged less than 2 years after adjusting for confounders (results not shown).

Table 2 Association between children's factors and diarrhea in children less than 5 years old

Factor	Total N (%)	Diarrhea in the past 2 weeks N (%)		P value
		Yes	No	
Gender (N = 9409)				0.010
Male	4857 (51.6)	430 (8.9)	4427 (91.1)	
Female	4552 (48.4)	337 (7.4)	4215 (92.6)	
Age (N = 9409)				<0.001
< 6 months	873 (9.3)	43 (4.9)	830 (95.1)	
6-11 months	981 (10.4)	131 (13.4)	850 (86.6)	
12-23 months	1932 (20.5)	247 (12.8)	1685 (87.2)	
24-35 months	1872 (19.9)	145 (7.7)	1727 (92.3)	
36-47 months	1907 (20.3)	134 (7)	1773 (93)	
48-59 months	1844 (19.6)	67 (3.6)	1777 (96.4)	
Child feeding practices (N = 3779)				<0.001
EBF/complementary feeding	1643 (43.5)	137 (8.3)	1506 (91.7)	
Replacement feeding	2136 (56.5)	283 (13.2)	1853 (86.8)	

Table 3 Multivariate analysis of factors associated with diarrhea in children

Variables	B	Adjusted OR	95% CI	P value
Wealth index quintile				0.001
Poorest	0.455	1.577	1.126 – 2.207	0.008
Second	0.166	1.180	0.875 – 1.592	0.277
Middle	0.459	1.582	1.221 – 2.050	0.001
Fourth	0.385	1.470	1.141 – 1.893	0.003
Richest®		1		
Ethnic group of household head†	-0.677	0.508	0.255 – 1.010	0.053
No. of children under 5 in household*	-0.244	0.784	0.651 – 0.943	0.010
Care taker's age	0.077	1.081	1.010 – 1.156	0.024
Child's gender [‡]	-0.210	0.811	0.696 – 0.943	0.007
Child's age				<0.001
<6	0.426	1.531	1.028 – 2.280	0.036
6 to 12	1.461	4.311	3.153 – 5.895	<0.001
13-23	1.394	4.031	3.035 – 5.355	<0.001
24-35	0.824	2.280	1.687 – 3.082	<0.001
36-47	0.722	2.059	1.518 – 2.793	<0.001
48-59®		1		
Constant	-2.344	0.096		<0.001

® Reference group, † Non Thai compared to Thai, * > 1 compared to 1, ‡ Female compared to male

DISCUSSION: The prevalence of diarrhea was lower than what has been observed in Latin America from Demographic and Health Surveys⁸⁾ despite the fact that the highest caseload of diarrhea in Thailand is in January¹⁰⁾. This could be due to higher access to clean water and better hygienic practices in child care in Thailand than in these countries. As with this study, other studies have found significant association between household economic status and diarrhea in children^{8,14)}. Children living in poorer households have higher diarrhea rates than their wealthier counterparts, probably due to inadequate access to sanitary facilities, unsanitary environments in the home and poor child hygiene. Reduced risk of diarrhea in children from households with more children under 5 years could be related to increased caretakers experience in child care. However, this could be limited to within reproductive aged group. Children with very elderly caretakers had higher diarrhea risk probably due to poor child care practices. The risk of diarrhea was higher in male than in female children, agreeing with other studies^{6,7)}. Higher risk of diarrhea was in children aged 6-23 months with the association between age and diarrhea being curvilinear as observed elsewhere¹³⁾. This could be related to beginning of environmental exposure and increased introduction of solid foods to children whose immune system is still developing. Unsafe child feces disposal methods (poor hygienic practices) and weaning were associated with increased risk of diarrhea in children aged less than 2 years. This study confirms the risk of early weaning as documented elsewhere⁷⁾. Lack of association between diarrhea and nutritional status of children was unexpected and should be investigated further. The study did not find an association between measles immunization status and diarrhea. This could probably be due to high measles immunization coverage and no measles outbreak during the study period. Access to safe drinking water is high in Thailand, probably explaining lack of association between source of drinking water and diarrhea in children. Promotion of recommended feeding

practices, targeting elderly and teenage child caretakers in diarrhea prevention, paying special attention in the care of male children and those aged 6-23 months and promoting hygienic child care practices are recommended to lower the prevalence of diarrhea in children.

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