



**Relationship Between Maternal Perceptions and Preventive Behaviors
Regarding Acute Diarrhea of Children in Bangladesh**

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Master of Nursing Science (International Program)**

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ABSTRACT

Diarrhea is the second leading cause of death among children under-five world-wide. In Bangladesh, diarrheal disease is one of the major causes of morbidity and mortality among children and infants. Nearly 26 percent of total deaths among children under five years old are due to diarrheal diseases (Rashid, Rahman, & Hyder, 2007). It is imperative to understand mothers' perception about diarrhea and their preventive behavior regarding acute diarrhea of children. This correlational descriptive study aimed to determine the level of maternal perceptions and maternal preventive behaviors about acute diarrhea and to examine the relationship between them. This study framework was guided by the Health Belief Model (Rosenstock, 1974). One hundred and seven mothers who had children aged less than 5 years old admitted with diarrhea at the International Centre for Diarrhoeal Diseases Research Bangladesh (ICDDR, B) were recruited. The questionnaire used for data collection consisted of three parts: demographic characteristics, maternal perceptions and maternal preventive behavior regarding acute diarrhea of children. Three experts ensured the content validity of the questionnaire. The measures of internal consistency reliability of the maternal perceptions and the maternal preventive behaviors

regarding acute diarrhea of children questionnaire yielded .94 and .84 respectively. Descriptive statistics and the Pearson correlation were employed for data analysis. The results showed that overall maternal perceptions and maternal preventive behaviors were at high and moderate levels respectively. There was a significantly positive moderate correlation between maternal perceptions and maternal preventive behaviors. The results supported the Health Belief Model. Health personnel should provide health education programs emphasizing the importance of maternal perceptions about their children's susceptibility to diarrheal disease, the seriousness of diarrheal disease and the benefits of preventive health behavior.

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CHAPTER 1

INTRODUCTION

Background and Significance of the Problem

Diarrhea is recognized as a major cause of child morbidity and mortality in developing countries (Banda et al, 2007; Gorter et al., 1998; Kosek, Bern, & Guerrant, 2003). It is the second leading cause of death among children under five years of age world-wide (BBS, Bangladesh Bureau of Statistics UNICEF, United Nations Children's Fund, 2007; Larson, Saha, Islam, & Roy, 2006). Most of these deaths are due to dehydration, and loss of large quantities of water and electrolytes from the body through liquid stools (BBS, Bangladesh Bureau of Statistics UNICEF, United Nations Children's Fund, 2007). Some deaths are attributed to the use of unsafe drinking water (Chiller et al., 2006). Global deaths from diarrhea among children aged less than five years were estimated at 1.87 million, approximately 19 percent of all the child deaths (Boschi-Pinto, Velebit, & Shibuya, 2008).

African and South-East Asia regions combined contain 78 percent (1.46 million) of all diarrheal deaths occurring among children in the developing world; 73 percent of these deaths are concentrated in 15 developing countries. Bangladesh is one of these 15 countries and was responsible for sixty-nine thousands diarrheal deaths in 2004 (Boschi-Pinto et al., 2008). The morbidity from diarrhea has remained relatively constant during the last two decades, with each child under 5 years of age experiencing an average of three annual episodes (Farthing et al., 2008). Most of the episodes are of a relatively short duration and can be treated easily and effectively with oral rehydration therapy and continued feeding with an appropriate diet. This

simple treatment regimen has reduced childhood mortality resulting from diarrhea world-wide (Lima & Guerrant, 1992).

Diarrheal disease is still a major health problem in Bangladesh. This may be because of lack of awareness about safe drinking water, hygiene practices, feeding children with hygienic food and defecation practices (Investor Relation Information Network [IRIN], 2008). The government of Bangladesh states that diarrhea kills an estimated 25,000 people annually, mostly children (IRIN, 2008). The highest rate of illness with mortality occurs in children less than 2 years old (Ministry of Health and Family Welfare, Government of the people's republic of Bangladesh [MOHFW, GoB], 2007). The peak of the prevalence of diarrhea occurs in the weaning period (BBS, Bangladesh Bureau of Statistics UNICEF, United Nations Children's Fund, 2007). The incidence of diarrhea in rural children in the age group between 0-2 years was 4.25 episodes per child per year (Pathela et al., 2006).

Diarrheal diseases broke out across Bangladesh in 2008, because of hot weather and the sources of safe drinking water dried up. Over 4,000 new diarrhea patients were admitted to government hospitals in 49 districts. Among them 556 patients were admitted to the International Centre for Diarrhoeal Diseases Research Bangladesh (ICDDR,B). On a daily average, 180-200 diarrhea patients were admitted to the facility (IRIN, 2008). The number of patients being admitted to the International Centre for Diarrhoeal Diseases Research Bangladesh (ICDDR,B) Hospital with diarrhea was constantly rising, and the excessive heat and polluted drinking water were the reasons (IRIN, 2008). In Bangladesh diarrhea hits two peaks, one in April-May and the other in September-October. To prevent diarrheal disease during the hot spells, families must maintain their personal hygiene including the

washing of hands after using the toilet, giving fresh boiled water to children and feeding children with clean food (IRIN, 2008). According to the ICDDR B Hospital statistical surveillance from 2004 to 2008, the total number of children with diarrhea admitted to this hospital was 5,596. An average of 1,119 diarrhea children (under five) was admitted there annually.

The causative agents of diarrhea are viruses, bacteria and parasites. Children who are exposed to these causative agents will be susceptible to diarrhea (Mishra, Gupta, & Yadav, 2004). Contaminated foods play a major role in the occurrence of diarrheal diseases. The transmission of infection occurs by direct contact with the agent, through oral-fecal transmission routes due to poor water quality, unhygienic behaviors, improper storage of food and inadequate sanitation practices (Halvorson, 2004).

Diarrhea is a disease that can be prevented by avoiding contact with causative agents. But children under 5 years of age are unable to protect themselves from these agents. They are taken care of by their parent, especially their mothers; therefore the maternal preventive behaviors for children are very important. There are many studies showing the incidence of diarrhea related to maternal preventive behaviors including hygienic practice, child feeding practices, safe water and defecation practices (Banda et al., 2007; Chiller et al., 2006; Gorter et al., 1998; Khan et al., 2004; Nanan et al., 2003; Osumanu, 2008).

Mothers are the closest person to children. Their behaviors towards their children should be explored, especially their preventive behaviors. A previous study showed that maternal preventive behaviors were found to be related to their perceptions (Pancharuniti et al., 2004). The results of Pancharuniti et al.'s (2004)

study carried out in Vietnam indicated that maternal health belief towards diarrheal diseases in children played a crucial role in their home management of acute diarrhea. Maternal perceptions on the susceptibility and severity of diarrhea and the benefits and barriers on maternal home care for diarrhea children were significantly correlated with maternal practices. It was interesting to find that half of the mothers did not perceive diarrhea as a danger for children. However, most of them agreed that severe diarrhea might cause dehydration and the death of children. They also perceived benefits and barriers for home management of diarrhea. Seventy percent of them believed an oral rehydration solution (ORS) could treat dehydration among children. Eighty three percent agreed that the continuous feeding of children was useful. Most of them (80%) felt that ORS preparation was difficult for them and they found it shameful to ask for advice from health personnel (77%) (Pancharuniti et al., 2004).

Dhaka, the capital of Bangladesh was chosen to be the place for conducting this study, as it is a crowded city which has an estimated 3.4 million people living in 5,000 slums (up to 60 percent). This living environment can contribute to the incidence of diarrhea. The living condition of people in the slum areas of Dhaka is that all families live in one room dwellings constructed usually of a bamboo frame, fencing and roof. Forty-five of 100 dwellings are built as shelters over water. On average 5 people live in one room (Podymow et al., n. d). Drinking water is from a tube well for most of them, and five to more than 100 families share each well. The rest use city tap water and one tap is shared among many people. A latrine area is located outside the room for most of them (86%). The rest use a lake, river or non-designated latrine areas as a toilet. Bathing water is from a tube well or river water. People bath themselves and their children daily, and wash their clothes 2-7 times per

week. Most of them feel that they did not live in a hygienic environment, and the slums had led to disease in their families. There were 3.1 ± 1.5 children per family, average age 10 years 2 months. Only 27 of 228 school-aged children had attended school. In fifty-eight of the 100 families one or more children had died, reporting a total of 89 deaths. Diarrhea, respiratory disease, trauma and stillbirth were cited as the known causes (Podymow et al., n. d). Under these living conditions, children in this area are at risk from diarrheal diseases.

Although diarrheal disease is recognized as a major problem in Bangladesh, no studies have been conducted on maternal preventive behaviors in child diarrheal disease or maternal perceptions. Therefore, this study was conducted to explore maternal perceptions and preventive behaviors of diarrhea in children. It was expected that the results from the study would be useful to enhance maternal preventive behaviors to reduce the incidence of diarrhea in children, especially children under five years old in Bangladesh. It could also fulfill the gap in knowledge of maternal preventive behaviors in diarrhea for children in Bangladesh.

Objectives of the Study

1. To determine the level of maternal perceptions (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) regarding acute diarrhea of children.
2. To determine the level of maternal preventive behaviors regarding acute diarrhea of children.
3. To examine the relationship between maternal perceptions and maternal preventive behavior regarding acute diarrhea of children.

Research Questions of the Study

1. What is the level of maternal perception of their children's susceptibility regarding acute diarrhea?
2. What is the level of maternal perception of the severity regarding acute diarrhea in their children?
3. What is the level of maternal perception of benefits of preventive behavior regarding acute diarrhea of children?
4. What is the level of maternal perception of barrier of preventive behavior regarding acute diarrhea of children?
5. What is the level of maternal preventive behaviors regarding acute diarrhea of children?
6. What are the relationships between maternal perceptions and maternal preventive behaviors regarding acute diarrhea of children?

Conceptual Framework of the Study

The Health Belief Model (HBM) was originally formulated to explain preventive health behaviors. It was used to guide to develop the conceptual framework of this study. The basic concept behinds this HBM is that, in order for a person to take action to avoid threat, a person needs to have the following beliefs (Rosenstock, 1974):

1. She or he was personally susceptible to the disease (perceived susceptibility);
2. The occurrence of the disease would have at least moderately serious consequences (perceived severity);

3. Taking a particular action would be beneficial by either reducing susceptibility or severity of the disease (perceived benefits); and

4. Perceived benefits should outweigh some barriers.

There were six components in this model included: perceived susceptibility; perceived severity; perceived benefits; perceived barriers; cues to action; and self-efficacy. Only four components were selected to study. These were: perceived susceptibility; perceived severity; perceived benefits; and perceived barriers. This is because many studies, both retrospective and prospective, showed that these four components were found to be the predictors of health related behaviors. Perceived barriers were the most powerful predictor among the HBM dimensions across all behaviors. Perceived susceptibility was a stronger predictor of preventive health behavior than sick-related behaviors, but the reverse was found for perceived benefits. Perceived severity was the least powerful predictor; however, it was strongly related to sick-role behaviors (Strecher & Rosenstock, 1997). In addition, these four components were the key basic components that needed to be determined before including all components in this study. This was because HBM has not been used to guide any research study related to preventive behaviors regarding acute diarrhea in children in Bangladesh, The following are the definitions and details of each component.

Perceived susceptibility refers to an individual's subjective perception of the risk of contracting a health condition or disease. *Perceived severity* addresses feelings about the seriousness of contracting an illness in terms of medical and social consequences. The combination of susceptibility and severity becomes a perceived threat. A perceived threat is a sequential function of perceived severity and perceived

susceptibility. A heightened state of severity is required before perceived susceptibility becomes a powerful predictor. *Perceived benefits* are based on the belief regarding the effectiveness of the advised actions to reduce the threat of diseases or illness. *Perceived barriers* refer to perceptions concerning the potential negative aspect of taking the advised action such as it being expensive, dangerous, inconvenient and time consuming. Thus the combined level of susceptibility and severity provide the energy or force to act and the perception of benefits (less barriers) provide a preferred path of action (Strecher & Rosenstock, 1997).

The four main components of the model are applied to use as the factors that are expected to relate to maternal preventive behaviors (Figure 1). In this study, perceived susceptibility to disease refers to a mother's subjective perception of her child contracting a diarrheal disease. Perceived severity of disease refers to a mother's perception of the seriousness of contracting a diarrheal disease. Perceived benefits and barriers of taking action refers to a mother's belief regarding the effectiveness and obstacle to preventive behaviors

The action here refers to maternal preventive behaviors. This is because the causative agents of diarrhea are viruses, bacteria, and parasites. Children who are exposed to these agents will be at risk of diarrhea. Children, especially children under five years old, usually contract diarrhea by oral-fecal transmission. The oral-fecal transmission normally comes from unhygienic behaviors, contaminated food, poor water quality, and inadequate sanitation practices (Halvorson, 2004). Preventive measures are recommended to be used by the care taker in order to prevent childhood diarrhea (Sheth & Dwivedi, 2006). The mother is the closest person who takes care of the children less than five years of age. Therefore, maternal preventive behaviors,

including hygienic practices, child feeding practices, safe water, and defecation practices, needs to be explored.

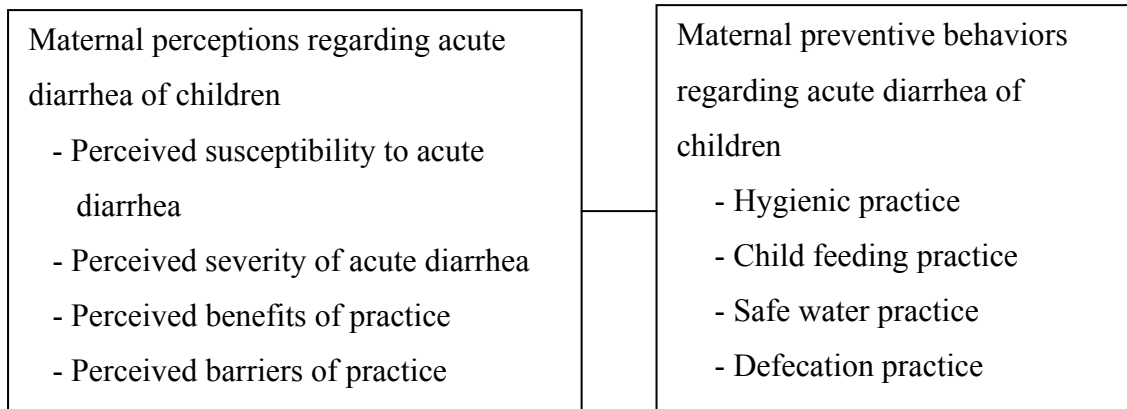


Figure 1

Conceptual Framework of the Study

Hypothesis

There were positive relationships between maternal perceptions (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) and maternal preventive behaviors regarding acute diarrhea of children.

Definition of Terms

Maternal preventive behaviors regarding acute diarrhea of children refers to maternal actions in taking care of her child in order to prevent her child from contracting diarrhea. It consists of hygienic practices, child feeding practices, safe water practices and defecation practices. It was evaluated by the Maternal Preventive Behaviors Regarding Acute Diarrhea Preventions Questionnaire which was developed by the researcher.

Maternal perceptions regarding acute diarrhea of children refers to the mother's subjective perceptions about diarrhea in children in terms of four subscales: (1) perceived susceptibility to acute diarrhea; (2) the perceived severity of acute diarrhea; (3) the perceived benefits of practices; and (4) the perceived barriers to practices regarding acute diarrhea. It was evaluated by the Maternal Perceptions Regarding Acute Diarrhea in children Questionnaire which was developed by the researcher based on the literature review.

Scope of the Study

This study aimed to determine the level of maternal perceptions and the maternal preventive behaviors regarding acute diarrhea in children. The sample was made up of mothers of diarrheal children, aged less than five years. They had been admitted with acute diarrhea for the first time at the pediatric unit of International Centre for Diarrheal Disease Research Bangladesh (ICDDR,B). Data were collected during the period November 2009-January 2010.

Significance of the Study

The results of this study provide the valuable information for health care professionals to develop health education program to improve maternal preventive behaviors. It helps by identifying the key factors related to maternal behavior. In addition, the findings are related to the key factors correlating to maternal behaviors guiding intervention to minimize the incidence of childhood diarrhea. Finally, the findings from this study also provide basic knowledge regarding maternal perceptions and preventive behaviors regarding acute diarrhea in children.

CHAPTER 2

LITERATURE REVIEW

In this chapter, the researcher reviewed literature relating to the topic of the study. This includes the Health Belief Model, diarrheal disease in children, maternal diarrheal preventive behaviors, maternal perceptions regarding acute diarrhea of children and factors related to maternal preventive behaviors.

Health Belief Model

The Health Belief Model (HBM) was originally formulated to explain preventive health behavior. It was proposed during the 1950's as a framework for explaining the reason for offering the medical screening programs by Public Health Science in the United States, but it was not very successful. A major public health concern was the widespread failure of people to accept screening tests for the early detection of asymptomatic diseases (such as tuberculosis, cervical cancer, diarrhea), even though these tests were provided free or at very low cost. The model was viewed as potentially useful to predict those individuals who would or would not use preventive measures and to suggest interventions that might increase the predisposition of resistant individuals to engage in health protecting behavior (Rosenstock, 1974; Pender, Murdaugh, & Parsons, 2002).

Components of Health Belief Model

Four components make up the main features of the model: perceived susceptibility; perceived seriousness; perceived benefits; and perceived barriers. The basic concept of model was that, in order for an individual to take action to avoid threat, he or she would need to believe that: (1) he or she was personally susceptible to the disease (perceived susceptibility); (2) that the occurrence of the disease would have at least moderately serious consequences (perceived seriousness); (3) that taking a particular action would be beneficial by either reducing his or her susceptibility or the severity of the disease (perceived benefits); and (4) the perceived benefits should outweigh the barriers (perceived barriers) (Rosenstock, 1974). Each of these perceptions, individually or in combination, can be used to explain health behavior.

Perceived susceptibility. Perceived susceptibility refers to one's subjective perception of the risk of contracting a condition or diseases. Personal risk or susceptibility is one of the more powerful perceptions in promoting people to adopt healthier behaviors. The greater the perceived risk, the greater the likelihood of engaging in behaviors to decrease the risk. Perceived susceptibility motivates people to be vaccinated for influenza, to use sunscreen to prevent skin cancer and to floss their teeth to prevent gum disease and tooth loss. It is logical that when people believe they are at risk to a disease, they will be more likely to do something to prevent it from happening. Unfortunately the opposite also occurs. When people believe that they are not at risk or have a low risk of susceptibility, unhealthy behaviors tends to result. Increased perceived susceptibility or risk is linked to healthier behaviors and decreased perceived susceptibility to unhealthy behavior. Increased perceived

susceptibility does not always lead to behavior change (Strecher & Rosenstock, 1997).

Perceived severity. Perceived severity refers to the feeling about the seriousness of acquiring an illness in terms of medical and social consequences. The perception of seriousness is often based on the medical information or knowledge available. It may also come from individual's beliefs about the difficulties of diseases or the effect disease would have on his or her life in general. The combination of susceptibility and severity results in perceived threat. If the perception of threat is in response to a serious disease for which there is a real risk, behavior often changes (Strecher & Rosenstock, 1997).

Perceived benefits. Perceived benefits are based on belief regarding the effectiveness of the particular actions available in reducing the threat of diseases or illness. It is a person's opinion of the value or usefulness of a new behavior in decreasing the risk of developing a disease. People have a tendency to adopt healthier behavior when they believe the new behavior will probably decrease their developing a disease. Perceived benefits play an important role in the adoption of secondary prevention behavior (Strecher & Rosenstock, 1997).

Perceived barriers. Perceived barriers are the most significant in determining behavior change. It refers to cost-benefit analysis which is beloved people undertake to weigh up beneficial action and its opposing limitations such as costs, side-effects, time and inconvenience. This is an individual's own evaluation of the obstacles in the way of him or her adopting a new behavior. To adopt a new behavior, a person needs to believe that the benefits of the new behavior outweigh the consequences of continuing the old behavior. When this enables barriers to be overcome, the new

behavior will be adopted. These barriers include difficulty with stating a new behavior or developing a new habit, fear or embarrassment (Strecher & Rosenstock, 1997).

Cues to action. In addition to the four basic components, cues to action is suggested as another factor influencing health behavior. Cues to action will have a greater influence on behavior in situations where the perceived threat is great. The cue to action construct is a little-studied phenomenon, so little is known about the extent of cues to action or their relative impact. In the health area, cues might be internal (such as perception of bodily states) or external (such as interpersonal interactions, mass media, or reminder postcards from a health care provider) (Rosenstock, 1974; Strecher & Rosenstock, 1997).

Modifying factors. Diverse demographic, socio-psychological and structural variables may affect the perception of an individual. They, especially socio-demographic variables, thus indirectly influence health-related behaviors. These are believed to have an indirect effect on behavior by influencing the perception of susceptibility, severity, benefits and barriers (Strecher & Rosenstock, 1997).

Self-efficacy. Self-efficacy was added to the original four components of the HBM in 1988 (Rosenstock, Strecher & Becher as cited in Strecher & Rosenstock, 1997). Self-efficacy is defined as one's confidence in one's ability to take action (Strecher & Rosenstock, 1997). Lack of self-efficacy is strongly related to the barriers component of the HBM. Self-efficacy will be a stronger predictor of behavioral change among those with a strong perception of threat and of the benefits of taking recommended health action (Rosenstock, Strecher, & Becher as cited in Strecher & Rosenstock, 1997). The HBM components and their linkages are summarized in Figure 2.

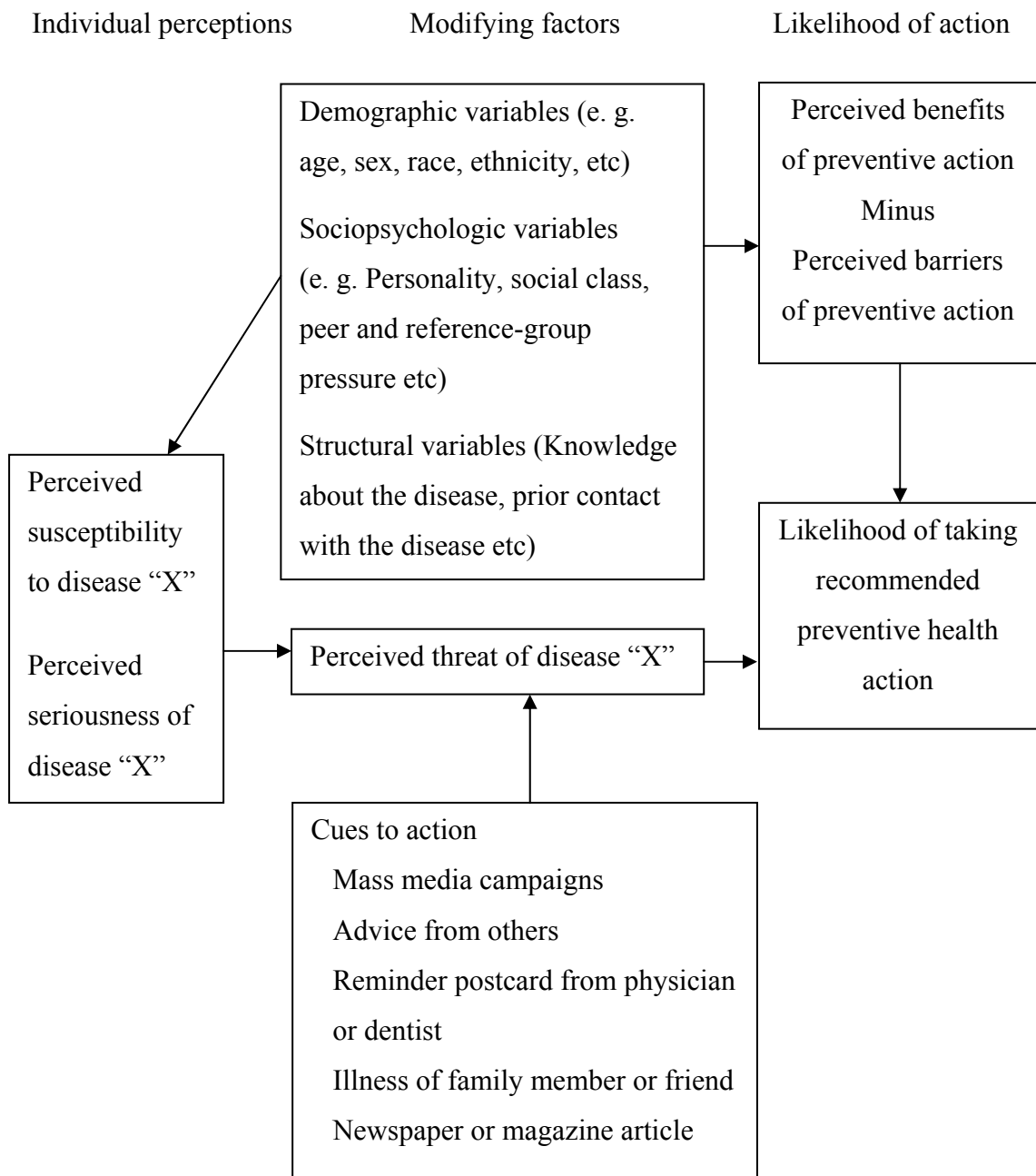


Figure 2

The Health Belief Model

In summary, the HBM was originally formulated to explain preventive behavior. The basic concept of model is based on the ability of an individual to take action to avoid threat. It has four dimensions which serve as the main construct of

model: perceived susceptibility; perceived seriousness; perceived benefits; and perceived barriers. Perceived susceptibility is the subjective perception of the risk of contracting a condition or diseases. Perceived seriousness is the feeling about seriousness and severity which results in perceived threat. A perceived benefit is the effectiveness of the particular action. Perceived barriers are an individual's own obstacles in adopting a new behavior. This model was modified and cues to action and self efficacy were added. Cues to action are external events that make people change their behavior and self-efficacy is a person's belief and ability to make a health related change.

Diarrheal Disease in Children

Diarrhea is one of the most common illnesses in all age groups. Children younger than 3 years have about 2 episodes of diarrhea per year. One episode of diarrhea occurs when three or more loose stools take place during a period of 24 hour (Clasen, Brown, & Collin, 2006). A new episode is defined only if the participant reports no diarrhea in the preceding week (Chiller et al., 2006). Diarrhea disease is an increase in the frequency and fluidity of bowel movement relative to the usual pattern of an individual. It is considered to be major contributor of illness and death among children of age up to 4 years in developing countries (Bani, Saeed, & Al Othman, 2002).

Definition

According to the World Health Organization guidelines (2005), diarrhea is defined as the passage of unusually loose or watery stools which occur usually at least three times in a 24 hour period. However, it is the consistency of the stools rather than the number which is most important (World Health Organization [WHO], 2005).

Epidemiologic Features

In industrialized countries, relatively few patients die from diarrhea, but it continues to be an important cause of morbidity and substantial health-care costs (Farthing et al., 2008). In developing countries during the past three decades, factors which contributed to a consistent decline in the mortality rate are widespread distribution and use of oral rehydration solutions (ORS), improved rates of breastfeeding, improved nutrition, better sanitation and hygiene (Farthing et al., 2008). The morbidity from diarrhea has remained relatively constant during the past two decades, with each child less than 5 years of age experiencing an average of three annual episodes of diarrhea. Oral rehydration solutions (ORS) and nutritional improvements probably have had a great impact on mortality rates caused by diarrhea (Farthing et al.).

Causative Agents

Diarrhea is caused by bacterial, viral, and parasitic organisms and is usually a symptom of gastrointestinal infection (Program for Appropriate Technology in Health [PATH], 2008). In developing countries, enteric bacteria and parasites are more prevalent than viruses and typically peak during the summer. In industrialized

countries, viruses are the predominant cause of acute diarrhea and are usually found during the winter season (Farthing et al., 2008). Rotaviruses are the major etiologic agents of severe infantile diarrhea. Rotavirus infection shows a characteristic seasonal pattern. In developing countries with temperate climates (unstable or unbalanced temperatures), the peak incidence is in winter, and in tropical or subtropical climates the virus circulates year-round. In Bangladesh, rotaviruses cause 6,000-14,000 deaths each year in children <5 years of age (Rahman et al., 2007). The temperature in Bangladesh is usually high from April through October and relatively low from December through February. Rotavirus in Bangladesh is affected by floods, which increase opportunities for transmission of the virus (Rahman et al.).

Types of Diarrhea

According to the WHO guidelines (WHO, 2005), diarrhea has been divided into 4 types as follows:

1. Acute watery diarrhea (including cholera)
2. Acute bloody diarrhea (dysentery)
3. Persistent diarrhea (last 14 days or longer)
4. Diarrhea with severe malnutrition (marasmus or kwashiorkor)

In the PATH, diarrhea is classified into 3 forms according to its major characteristics; these are acute watery, persistent, and bloody diarrhea. Acute watery diarrhea is the type that is most likely to lead to rapid dehydration. This form is the most deadly in young children and is commonly associated with rotavirus, enterotoxigenic *Escherichia coli*, or *Vibrio cholerae* (cholera). Bloody diarrhea is often related to malnutrition, intestinal damage, and secondary sepsis. It is often

associated with dysentery. Persistent diarrhea, a less common form, is typically connected with malnutrition and is disproportionately associated with an increased risk of death.

Sevier and Kline (2003) classified diarrhea according to the onset of the disease as acute and chronic diarrhea. Acute diarrhea is a sudden increase in frequency and change in consistency of stools which is often caused by an infectious agent in the gastro-intestine. It may be associated with upper respiratory or urinary tract infections. Antibiotic therapy or laxative use can also lead to acute diarrhea in children. Most cases are caused by infectious agents, including viral, bacteria and parasites pathogens. Chronic diarrhea is defined as an increase in stool frequency and increased water content with duration of more than 14 days. It is often caused by chronic conditions such as malnutrition syndromes, inflammatory bowel disease, immune deficiency, food allergy, lactose intolerance and chronic non-specific diarrhea.

Types of diarrhea have been classified differently based on the criteria the authors used. However, the types of diarrhea are quite similar to each others.

Clinical Manifestations

The clinical manifestations of diarrhea are fever, nausea and vomiting, bloody stools and abdominal pain (Farthing et al., 2008). Most serious consequences of diarrhea disease are dehydration, electrolytes disturbance and malnutrition (Wong & Hockenberry, 2003). Generally signs of dehydration are skin fold, altered neurologic status, sunken eyes, and dry oral mucosa (Christopher et al., 1996). Dehydration may be mild, moderate, or severe. In children, mild dehydration signs are pale skin color,

decreased skin elasticity, dry mucous membranes, decreased urine output, and capillary refill of less than 2 seconds. Moderate dehydration signs are gray skin, poor skin elasticity, very dry mucous membranes, oliguria, and blood pressure normal or lowered, pulse increased, capillary refill of 2-3 seconds. Severe dehydration causes mottled skin color, very poor skin elasticity, parched mucous membranes, oliguria and azotemia, a rapid and thready pulse, capillary refill more than 3 seconds and lowered blood pressure (Wong & Hockenberry).

Treatment

Diarrhea can be treated effectively with oral rehydration solution (ORS), oral rehydration therapy (ORT) and zinc supplementation. Exclusive breastfeeding up to 6 months and continuing to breastfeed up to 24 months of age helps to reduce the risk of malnutrition which is more liable to cause death during diarrhea. Treatment can include a number of processes.

Treatment at home. In developing countries generally, oral rehydration therapy (ORT) includes administration of fluid by mouth to prevent or correct dehydration and it is a cost-effective management of acute gastroenteritis. ORS is the fluid specifically developed for ORT. A more effective, lower-osmolarity ORS has been developed for global use (Farthing et al., 2008). ORS is an important for home treatment to prevent dehydration. Children with diarrhea need extra fluid and salt to replace their losses of water and electrolytes. Mothers are the persons who prepare ORS and give it to the child at home. It may be prepared from pharmaceutical stores or as home based ORS by dissolving 3 gm of table salt and 18 gm of common sugar in one litre of water. Salted rice water, vegetable or chicken soup with salt, plain

water, fruit juices, sweetened tea, and coffee should be given. The breastfeeding of the children should be continued and Zinc supplement should be given (10-20 mg every day) for 10 to 14 days (WHO, 2005).

Management of acute watery diarrhea. Treatment depends on the severity of dehydration with cholera and usually requires large amounts of ORS solution to replace large continuing losses of watery stools so that dehydration is corrected. An antimicrobial drug in the form of doxycycline or erythromycin is recommended (WHO, 2005).

Management of persistent diarrhea. Treatment is done mainly to prevent or treat dehydration by providing appropriate fluids and a nutritional diet. Supplementary vitamins, minerals, zinc and antimicrobials are used to treat diarrhea (WHO, 2005). Continued breastfeeding may also play an important role in preventing diarrhea in infants. Reduction in the lactose diet and a diet consisting of fresh fruit, well cooked vegetables, rich in vitamin A, zinc, magnesium and copper, should be given in order to prevent diarrhea (WHO, 2005).

Management of diarrhea with severe malnutrition. This should be conducted in a hospital. ORS solution should be given and intravenous rehydration should be used only for shock. The modification solution which is appropriate for severely malnourished children with diarrhea, consists of less sodium (37.5 mmol/L), and more potassium (40 mmol/L) and sugar (25 mg/L) All severely malnourished children should be treated with a broad spectrum antibiotics for infection control. Breastfeeding should be continued and multivitamin mixtures iron and vitamin 'A' should be given in the form of a diet (WHO, 2005).

Management of acute bloody diarrhea. This is similar to persistent diarrhea and diarrhea with severe malnutrition.

Prevention of Diarrhea

Deaths from diarrheal disease in children can be reduced by both prevention and treatment. The causative agents of diarrheal disease are transmitted through the fecal-oral route and are spread through contaminated foods and drinking water or from person to person as the result of poor hygiene and sanitation (PATH, 2008). Hence, diarrheal disease prevention methods include improving hygiene, water quality, and sanitation. In addition, exclusive breastfeeding can prevent infants under 6 months from getting diarrhea.

Improved hygiene. Hygiene plays an important role in the prevention of diarrhea in children. Over the last decade, several epidemiological studies reported that hygienic practice is considered as a risk factor for childhood diarrhea. There is a relationship between hygienic practice and diarrhea prevention (Gorter et al., 1998). Hygienic practices include hand washing, food and water hygiene, cleaning of food preparation areas, and general cleanliness (Gorter et al.). Contaminated hands are one of the main routes whereby diarrhea is spread. Hand-washing with soap can interfere with the transmission path of diarrhea (Peterson & Kremer as cited in PATH, 2008). However, in some developing countries, soap is not always a priority for use in hand washing, which can substantially raise its cost. Ash is used as the cleanser. Hand-washing after defecation is not commonly practiced. Only 3 percent of people in Ghana, 6 percent in Peru and 31 percent in Senegal wash their hands after defecation

(PATH, 2008). Optimal hand-washing with soap can reduce diarrhea by 45 percent (Cumming as cited in PATH, 2008).

Improved water quality. Safe water is critical for daily life because water touches every part of our lives. Water is used from drinking to food preparation to bathing and cleaning. However, in some developing countries like Bangladesh where infrastructure is lacking, children are more likely to be exposed to water contaminated with pathogens, including bacteria, viruses and parasite from human and animal waste. Exposure to contaminated water puts young children at risk of diarrheal disease (PATH, 2008). To purify water and improve sanitation are cost effective preventive measure. Boiling water is the most common method of water purification. The safe storage of purified water is necessary to prevent subsequent water contamination.

Improved sanitation. Sanitation involves the safe disposal of human and animal waste with its associated hygiene benefits. Uncollected and untreated waste leads to contaminated water sources, dirty food and people's hands which can spread diarrheal disease (PATH, 2008). Sanitation can be improved by discouraging open defecation and encouraging the safe disposal of human waste with covered, properly maintained pit latrines in rural areas and community septic tanks and sewer systems in urban areas. Children's waste should be properly handled and disposed. Improved sanitation can reduce diarrheal disease by 36 percent (Cumming as cited in PATH, 2008).

Infant and child feeding. Breast milk is the healthiest and safest food for infants in the first six months. This is because breast milk contains essential nutrients, antibodies and fluids which can prevent infants from illness, especially diarrheal

disease. Infants are susceptible to infection as their immunological organs are not well developed. Therefore, breast milk is the most suitable food for them. Infants under 2 months of age who are not breastfed are 25 times more likely to die from dehydration caused by diarrhea than infants who are exclusively breastfed. Infants who are fed cows' milk are 18 times more likely to die from diarrhea when compared with infants who are exclusively breastfed (Feachem & Koblinstry as cited in PATH, 2008). Exclusively breastfeeding is recommended for infants in the first six months of life. After six months, breast milk needs to be complemented with other foods (PATH).

Exclusively breastfeeding prevents diarrheal disease in two ways. First, it eliminates the intake of potentially contaminated foods and water, at the time when infants have poorly developed digestive systems. Second, breast milk contains secretory antibodies and other immune factors that give specific protection against gastro-intestinal pathogens, and has demonstrated anti-inflammatory and immunomodulatory effects (PATH, 2008).

Preventive Measures Against Diarrhea in Bangladesh

In Bangladesh, diarrheal disease is one of the major causes of morbidity and mortality among children and infants. Nearly 26 percent of total deaths among children under five years old are due to diarrheal diseases. On an average, each child suffers 3.5 times a year. Seasonal and cyclical patterns of the disease frequently turn into epidemic situations, especially after floods and cyclones. These epidemics create panic among people. So there is need to have special measures to control epidemics in the shortest time. There is need for a general program of preventive and control of

diarrheal diseases, which is the role of the National program for the control of diarrheal diseases (CDD).

The National program for the control of diarrheal diseases (CDD) is being implemented as a component of the Public Health Centre. It is under the supervision of the medical officer-in-charge of CDD at the Upazila Health Complex. At the national level, a Director, assisted by other supporting staff, is responsible for planning, monitoring and reviewing the program. The program aims: (a) to reduce diarrheal mortality by 50 percent; (b) to reduce morbidity and diarrhea related malnutrition; (c) to increase mother's/caretaker's awareness and knowledge of proper feeding practices during and after diarrhea episodes, including hygienic practices and home management of diarrhea; (d) to develop systems to monitor ORS distribution and the reporting the incidence of diarrhea and mortality; (e) to achieve 80 percent correct use of ORT; and (f) to strengthen social movements for the promotion of ORT (Rashid et al., 2007).

Strategic implementations of the program are: (1) early detection of epidemic; (2) active case finding; (3) provision of early treatment of cases; (4) teaching paramedics and local volunteers to administer ORS solution; (5) notification to the local and central authorities; (6) disinfection and disposal of stools, vomit and contaminated clothing; (7) health education; (8) provision of safe water and sanitary latrines; (9) chemoprophylaxis; and (10) epidemiological investigation and report writing (Rashid et al., 2007).

Maternal Diarrheal Preventive Behaviors

Health protective behavior (HPB) is described as the activities that people perform to protect their health (Harris & Guten, 1979). Maternal preventive behavior is the activities or actions that mother perform or practice to protect their children from illness. Therefore, maternal diarrheal preventive behaviors are actions undertaken by mothers in order to prevent their children from getting diarrheal diseases. These include hygienic practices, child feeding practices, safe water and defecation practices.

Hygienic practice. A hygienic practice is a risk factor for childhood diarrhea. Hygiene has two aspects, personal and environmental. Personal hygiene aims to promote standards of personal cleanliness within the setting of the condition where people live. It includes bathing, washing, cleaning of clothes, care of nails, feet, teeth, and toileting (Park, 2000). Environmental hygiene includes the use of soap, storage of food, water hygiene and safe disposal of feces, and presence of latrines (Gorter et al., 1998). The cleanliness of the child, mother, and surroundings has been observed to be associated with child nutritional status, morbidity and mortality (Zeitlin as cited in Range, Naved, & Bhattaria, 1997).

In Bangladesh, ground cleanliness was associated with morbidity and mortality at the age when children were crawling (Range et al. 1997). Other important hygiene-related factors in Bangladesh have been found to be culture, toileting training habits, hand washing and food cleanliness, and access to modern health care (Range et al., 1997). In Southern India, hand washing with soap after defecation was perceived to be more common in the under-15 age group of children (86.4%) (Banda et al., 2007). The positive relationship between hygienic practice and diarrheal disease

was found in Nicaragua (Gorter et al., 1998). General hygiene behavior related to diarrhea included cleanliness of the kitchen and living room, and disposal of rubbish and child's diapers (Gorter et al.). Improving hygienic practice is the most important step to reduce the global burden of diarrheal disease in children (Curtis et al., 2003).

Child feeding practice. Breastfeeding is the best method of feeding young infants. It is an important contributing factor to a child's health and well-being. Breastfeeding is a very effective way of protecting young infants from diarrheal disease (VanDerslice, Popkin, & Briscoe, 1994). Exclusive breastfeeding is suggested for the infant in the first six months of life. Complementary foods should be introduced to the infant after six months of age.

Exclusive breastfeeding: Exclusive breastfeeding means no other food or drink, not even water, is permitted, except for supplements of vitamins and minerals or necessary medicines (WHO as cited in Keusch et al., 2006). The optimal duration of exclusive breastfeeding is six months (WHO as cited in Keusch et al., 2006). Exclusive breastfeeding is quite low during the first four months after birth (Wang, Wang, & Kang, 2005). Maternal education, employment, income and urban residence were the strongest determinants of the length of breast feeding (Reddy, n. d.). Although, breastfeeding is almost universal in Bangladesh, the rates of exclusive breastfeeding remain low (Mihirshahi, Oddy, Peat, & Kabir, 2008). Nationally, 35.6 percent of infants were breastfed within one hour of birth and 81.5 percent of them were breastfed within one day of birth (BBS, Bangladesh Bureau of Statistics UNICEF, United Nations Children's Fund, 2007). Nearly all mothers (97 %) breastfed their children for some period of time. The proportion of Bangladeshi women initiating breastfeeding is relatively low. The duration of breastfeeding has

frequently been associated with socio-economic and demographic factors such as maternal age and education. Multivariate analysis showed that women who had lived in rural areas were 22 percent less likely to terminate breastfeeding than women in urban areas. The study found the duration of total breastfeeding to be shorter among mothers with secondary and higher education than among those with less education or not educated (Giashuddin, & Kabir, 2003). Recent data shows that only 38 percent of children aged 2–3 months are exclusively breastfed and 23 percent of children are given complementary foods before sixth month (Mihirshahi et al., 2008).

Complementary feeding: Complementary foods are defined as any solid or liquid foods with nutritional value, other than breast milk, offered to breast-fed infants (Giugliani & Victora, 2000). After six months, breast milk needs to be complemented with other foods. During this period the mother should be educated by health care workers about proper food preparation, handling or storage practices. Food safety and sanitation are important aspects of providing healthy food for children. Improper food preparation, handling, or storage can quickly result in food being contaminated with pathogens that may lead to diarrheal diseases, if infants were fed with this contaminated food. To prevent children from getting diarrheal disease, mothers should feed freshly cooked food to the child. Proper hand washing techniques should be used before food preparation and before feeding. Raw fruit needs to be washed before giving them to the child. Cooked food must be stored and covered to prevent further contamination by fingers and flies (Wang, Wang, & Wang, 2005). Only utensils and dishes should be used that have been washed with sanitizers and disinfectants (All Family Resources, 2006). Breastfeeding for children of 6 to 24 months, with appropriate complementary food is an optimal feeding plan. This can

significantly reduce diarrhea and provide the nutrients that prevent the cognitive effects of repeated diarrhea episodes (PATH, 2008).

In Bangladesh many mothers reported that they gave complementary foods to infants aged less than 5 months. In rural Bangladesh family food was still not given at age 12-14 months. The introduction of complementary foods often occurs too early or too late (Helen Keller International, 2003). Nearly half the mothers believed that all meat and fish were harmful to children less than two years of age. This study also found that food regulations are more often directed at children rather than at older pre-school children, 3-5 years of age. Dietary restrictions are also widespread in Bangladesh during common childhood illnesses, such as diarrhea and fevers (Range et al., 1997).

Safe water practice. Water is very important for human life. It is used from drinking to food preparation, to bathing and to cleaning. Therefore, access to safe, clean water is crucial for our lives. However, in the developing countries where infrastructure may be insufficient, people are more likely to be exposed to water contaminated with pathogens from human and animal waste. Exposure to contaminated water puts people, especially young children, at risk to diarrheal disease. Water should be purified prior to use or drinking. Purification of unclean drinking water typically by boiling and the use of chlorine in water are recommended. Boiling water is the most common method used in households today. Safe storage following water purification treatment is necessary in order to prevent subsequent water contamination. McLennan, (2000) found that 55 percent care-givers in a poor district of Santo Domingo, Dominican Republic were not then boiling drinking water

for the children and only 27 percent of people used chlorinated water (McLennan, 2000).

In Bangladesh, only 16 percent householder use tube well water for domestic purposes. In addition to drinking, water is use for various purposes like cooking, food preparation, and personal hygiene. Only the use of safe drinking water can help reduce disease. The problems like the inadequate supply of sanitation, information, and education affect the quality of water which people consumes (Persson, n. d.). Water safety generally depends on the quality of the water sources and treatment applied in the domestic setting (Banda et al. 2007). Providing clean and safe drinking water is more expensive and complex than providing sanitary latrines (Dodge, 1990). In countries in Africa, more than half of the population uses unsafe drinking water (WHO as cited in Oliver & Ifeanyi, n.d.).

Defecation practice. A child dies every 20 seconds as a direct result of poor sanitation. It can be improved by discouraging open defecation and encouraging the safe disposal of human waste in properly covered pit latrines. Sanitation can reduce diarrhea 30 percent. Generally men and women have very different defecation habits. This is because of women have greater need for privacy and men can defecate openly. (Hanchett & Nahar, 2003).

In Bangladesh, open defecation has been a common socio- cultural practice both in rural and urban areas. The percentage of open defecation in 2003 was 42 percent (Ministry of Local Government [MLG], 2008). At the present, it is less than 10 percent (MLG, 2008). Poverty, lack of knowledge, cultural practices and individual perceptions are the key factors influencing the way to defecate. There has been a common belief among people generally that child feces are not so harmful. As

a result they have not been careful about the safe disposal of child feces. After defecation by children, they usually throw out feces into drains, garbage and open places (MLG, 2008). During 2003 to 2005, safe disposal practices were increased from 13 to 31 percent (MLG, 2008). Other studies found that inadequate human excretal disposal leads to an increase in the list of environmental pollution problems in Bangladesh. Even now only 5 percent of dwellings have a sanitary latrine. Around 33 percent of the population defecates in a sanitary latrine and approximately 33 percent of the population defecates in fixed places. Therefore, diarrhea continues to trouble the population, especially children (Dodge, 1990).

In countries in Africa, about two-thirds of the population lack good sanitary means of excreta disposal. Nigeria, like other developing countries, is faced with the dilemma of inadequate disposal of excreta-related human waste discharged into the environment. Thus in rural farming communities of southeast Nigeria it is still common to practice defecation in open fields and farmland. Excreta-related diseases especially affect children under 5 years of age as their immune systems are not fully developed and may be further impaired by malnutrition (WHO as cited in Oliver & Ifeanyi, n.d.).

In rural India, Banda et al (2007) reported a 32 percent decrease in the rate of morbidity due to diarrhea was found by improving sanitation practices. There are few reports on defecation practices and the availability or usage of toilets. Almost 74 percent defecated in open areas, some believed that toilet construction was expensive and most of them did not believe that there was any relationship between open-air defecation and diarrheal diseases (Banda et al., 2007). Water-sealed latrines are one of the environmental control measures against flies (Galal, Sundaram, Hassan,

Salem, & Lashin, 2001). In developing countries, diarrhea has been 32 percent reduction by improving sanitation and 47 percent by hand washing with soap (Banda et al., 2007).

Maternal Perceptions Regarding Acute Diarrhea of children

Maternal perceptions regarding acute diarrhea of children include: the mothers perceived the susceptibility of their children to diarrheal disease; the seriousness of the disease; and the benefits of and the barriers to preventive behaviors. Preventive behaviors were the behavior the mothers' performed that could protect children from diarrheal disease.

Perceived susceptibility to diarrhea. This dimension refers to mothers' subjective perceptions of the risk of their children to contract diarrheal disease. Pancharuniti, Shiyalap, Dung, and Wongsawass, (2004) conducted a study of maternal practice on the management of acute diarrhea among children under five years, in Nam Dinh City, Vietnam. They reported that 81.9 percent of mothers perceived that malnutrition status could cause severe diarrhea among children and a majority of them (76.3%) perceived that diarrhea could cause dehydration (Pancharuniti et al., 2004). Another study conducted in Thailand by Sripituk (2006) found that some mothers perceived diarrhea as a common stage of the growth process among infants. It was normal for the children to have diarrhea when they reached certain stages of development. This might be the reason why they did not perceive that their infants were susceptible to diarrhea. In addition, 63.85 percent of the infants in the study never had diarrhea. Therefore, they did not feel threatened (Sripituk, 2006).

Perceived severity of acute diarrhea. The dimension of perceived severity refers to the feeling of mothers concerning the seriousness of diarrheal disease. Acute diarrhea is life threatening because it leads to fluid loss and can cause severe dehydration. It can weaken the victims' immune systems and make them more susceptible to future diarrhea episodes as well as other illnesses (PATH, 2008). Diarrhea is not only an immediate health threat to children, but can also have long-term negative effects on a country's socio-economic development (EHP, UNICEF/WES, USAID, World Bank/WSP, WSSCC, 2004). Diarrhea has an adverse effect on growth and is an important cause of malnutrition. Malnourished children have more severe diarrhea and an increased risk of death from a variety of infectious diseases, including diarrhea (Black et al., 1984; PATH). Pancharuniti et al (2004) reported that the maternal perception of the severity of diarrhea was that half of the mothers did not perceive diarrhea as danger to children. Most of them perceived watery stools as a dangerous sign and severe diarrhea may be a cause of death for children (Pancharuniti et al., 2004). Acute watery diarrhea seriously weakens children, thereby greatly increasing the risk of malnutrition and impaired child development (PATH).

Perceived benefits of diarrheal preventive practice. The perceived benefits of diarrheal preventive practices refer to the mother's beliefs regarding the effectiveness of the preventive behaviors in reducing the chances of their children getting diarrhea. A study on 270 mothers of diarrheal children in Vietnam indicated that nearly two-third of mothers had the hygienic practice of hand washing as their personal hygiene habit. Among those, 60.4 percent of mothers had a specific place for washing hands, 73.7 percent of them washed hands with soap and 57 percent of mothers washed

hands before food preparation. There were 55.6 percent of mothers who washed hands before feeding their children, 61.1 percent washed their hands after defecation and 54.4 percent washed their hands after helping children defecate (Pancharuniti et al., 2004).

Perceived barriers of diarrheal preventive practice. The perceived barriers of diarrheal preventive practices refer to how mothers perceive obstacles to carrying out preventive behavior. A study in Thailand showed that mothers did not perceive any barriers to diarrheal preventive practice. This is because some preventive practices were done in their daily living, such as covering food to prevent exposure to the flies and having freshly cooked food (Sripituk, 2006). The delayed introduction of complementary foods was one of the factors influencing diarrhea. Other reasons for this delay included income level, personal socio-economic characteristics, and education. In poor families, the mothers delayed the introduction of complementary foods because they perceived that the child is not interested in eating. Mothers and grandmothers reported that one should wait until the child feels hungry before giving them any kinds of food (Engle, n. d.).

Factors Related to Maternal Preventive Behaviors

Maternal education. Maternal education plays a vital role in their children's health status. The study of Huq and Tasnim (2008), found that the mother's education was a powerful and significant predictor of the child's health status in Bangladesh. This was largely related to the health status of the children under five. This study suggested that in order to improve the health conditions of children in Bangladesh, maternal education should be given top priority (Huq and Tasnim, 2008).

A study in Nepal showed that maternal education was related to the direct care of the child and the hygienic practices of the mother. The level of the mother's education was associated with hand washing but in an unexpected positive direction. This was that less educated mothers were more likely to wash their hands. It was suggested by the researcher that uneducated mothers might see increased contamination in the environment and so washed their hands more often (Laston, Schumann, Black, & Dahal, 1993).

Family income. This was defined by using data about the head of the family. It included the type of occupation, branch of activities, position within the means of production, monthly income, type of establishment, number of employees, and level of education (Joveleviths, Prolla, Fernandes, Correa, & Coelho, 2004). The low socio-economic status of parents corresponded with greater vulnerability of their infants irrespective of the mode of feeding (Khan et al., 2004). Income is an important resource for initiating continuing self-care and dependent person care (Orem as cited in Noirungsee, 2004). People with high incomes will have better opportunities than people with low incomes in seeking facilities for healthy self care practice (Pender as cited in Noirungsee, 2004).

Maternal age. This factor influences maternal perceptions and maternal behaviors to diarrheal children. Age is an indication of maturity or the person's ability in managing the environment, thinking and perceiving. It also reflects the ability to comprehend and make decisions (Sripituk 2006).

Diarrheal diseases are a global health risk and threat because of world climate, demographic change and the depletion of natural resources. In the developing world, acute diarrheal diseases break out in hot and cold climates. Diarrhea is the combined

result of poor hygienic practices, lack of awareness of the transmission of disease, and a shortage of safe water. Poor sanitation linked to unplanned urbanization is also a major factor. Behavioral change has been focused on as a key strategy for promoting hygiene and sanitation practices. Improved sanitation practices include: reducing defecation in the open; safe disposal of child feces; and washing hands before preparing and eating food and defecation. These are considered the behavior changes to be measured. In the socio-cultural perspective of Bangladesh, open defecation has been a common practice both in rural and urban areas. Washing hand at crucial times is a good way of avoiding intestinal disease, and has been emphasized in promoting hygiene in Bangladesh.

Mothers are the closest persons to children. She takes care of her child at all times and everywhere. The mother has perceptions about the risk of contracting a condition or diseases. Personal risk or susceptibility is one of the most powerful perceptions in motivating people to adopt healthier behavior. It is logical that when people believe they are at risk for a disease they will be more likely to do something to prevent it from occurring. Meaningful perception is often based on medical information or knowledge. It may also come from an individual's beliefs about difficulties concerning diseases or the effect of disease on his or her life in general. Perceived benefits are based on beliefs regarding the effectiveness of the particular actions available for reducing the threat of disease or illness. Perceived barriers are the most significant factors in determining behavior change. This refers to cost-benefit analysis which makes people weigh up the benefits of action and considers its opposing limitations, such as costs, side-effect, time and inconvenience.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents the research methodology used for this study. It consists of study design, study setting, population and sample, instrumentation, data collection, ethical considerations and data analysis.

Study Design

A correlational descriptive study was conducted to assess the level of maternal perceptions and maternal preventive behaviors for the prevention of acute diarrhea in children, and to explore the relationship between maternal perceptions and maternal preventive behaviors. A purposive sampling technique was used to recruit subjects within a specific timeframe. The data were analyzed by using descriptive statistics. Correlational analysis was used to identify relationship between maternal perceptions and maternal preventive behaviors for diarrheal children.

Study Setting

This study was carried out at the International Centre for Diarrhoeal Diseases Research, Bangladesh (ICDDR, B) which is located in Dhaka, the capital city of Bangladesh. The ICDDR, B is a major center for research regarding diarrheal diseases. The centre treats more than 100,000 diarrheal patients a year. It is the only international health research institution situated in the developing world (Albert, Faruque, Faruque, Sack, & Mahalanabis, 1999). It is the only specialized hospital in

Bangladesh for patients with diarrhea. There are many diarrheal children admitted from different places.

Population and Sample

The population was the mothers of children with acute diarrhea in Bangladesh. The sample were mothers who had children less than 5 years old who were admitted with diarrhea to the International Center for Diarrhoeal Diseases Research, Bangladesh hospital (ICDDR) during the period November 2009 to January 2010.

Estimation of sample size. The sample size was estimated using power analysis based on a previous study entitled “Maternal Practice on Management of Acute Diarrhea Among Children Under five Years old, in Num Dinh City, Vietnam” (Pancharuniti et al., 2004). The effect size was calculated based on correlation coefficients taken from that study. The correlation coefficients of the maternal perception on susceptibility, severity of diarrhea, benefits, and barriers to maternal home care for children with diarrhea with the maternal home practices on management of acute diarrhea were .15, .31, .28, and .16, respectively. In addition, the total scores of maternal perception were significantly related to the practices ($r = .28$). According to Polit & Beck (2008) at the level of alpha (α) .05, power .80 and effect size equal .28, the total sample size was 107 (Polit & Beck, 2008, p 605).

Sampling technique. A purposive sampling technique was used to recruit mothers who met the following criteria:

1. Had a child aged less than 5 years old, who had been admitted for the first time to general ward at the ICDDR hospital for diarrheal disease
2. Could understand the Bengali language and be able to communicate in it

3. Willingness to participate in the study

Instrumentation

A structured questionnaire was used for data collection (Appendix A). The questionnaire consisted of three parts including: Demographic Information; Maternal Perceptions; and Maternal Preventive Behavior Regarding Acute Diarrhea of Children. The items of the questionnaire were developed based on the basic concepts of the Health Belief Model, relevant literature and from previous studies.

Part I: Demographic Information

This part consisted of the child and mother's demographic information, including; child's age, gender, type of child feeding, maternal age, education, occupation, monthly family income, religion, water sources, and toilet facilities.

Part II: Maternal Perceptions Regarding Acute Diarrhea of Children

Questionnaire

The questionnaire was developed by the researcher based on relevant literature review and the context of Bangladesh. It consisted of 21 items to measure the following perception of mother towards the susceptibility of the children to acute diarrhea (4 items); the severity of acute diarrhea (5 items); the benefits of preventive behaviors (6 items); and barriers to performing preventive behaviors (6 items). A 5 point Likert scale was used rate each item from 1-5 with strongly disagree = 1, agree = 2, not certain = 3, disagree = 4, strongly disagree = 5. The possible mean score range was from 1-5. The level of Maternal Perceptions Regarding Acute Diarrhea in Children was divided into three levels; low, moderate and high. This was obtained by dividing the mean score by 3. The class interval was 1.33. The scoring

levels were categorized into: (1) low maternal perceptions, ranging from 1.00-2.33; (2) moderate maternal perceptions, ranging from 2.34-3.66; and (3) high maternal perceptions, ranging from 3.67-5.00.

Part III: Maternal Preventive Behaviors Regarding Acute Diarrhea of Children Questionnaire

The questionnaire was developed by the researcher based on relevant literature review and the context of Bangladesh. It consisted of 28 items to measure: the preventive behaviors of mothers towards hygienic practice (9 items); child feeding practices (7 items); safe water practices (5 items); and defecation practices (7 items). The negative items were numbers 6 and 7 of the child feeding practices, number 4 of safe water practices, and number 2, 3 and 6 of defecation practices. The scores of the negative items were reversed. The questionnaire used a 5 point Likert scale to rate each item from 0-4 with 0 = never, 1 = sometime, 2 = often, 3 = very often, 4 = always. The possible mean score ranged from 0-4. The level of Maternal Preventive Behavior Regarding Acute Diarrhea of Children was divided into three levels; low, moderate and high. This was obtained by dividing the mean score by 3. The class interval was 1.33. The scoring levels were categorized into: (1) low maternal preventive behavior, ranging from 0.00-1.33; (2) moderate maternal preventive behaviors, ranging from 1.34-2.66; and (3) high maternal preventive behaviors, ranging from 2.67-4.00.

Translation of the Instruments

The questionnaire was first developed in English by the researcher based on the basic concepts of HBM, relevant literature and from the previous studies. It was

then translated to Bengali by an expert from the college of nursing Bangladesh. Then it was back translated to English by an expert from the ICDDR, Bangladesh hospital to maintain the structure of the contents of the instrument. Finally, these two English versions of the instruments were reviewed by a Professor of medicine to compare the language discrepancies and similarities in the original and the revised instrument.

Validity and Reliability of the Instruments

The content validity of the instrument was evaluated by the two experts from the Department of Pediatric Nursing, Faculty of Nursing, Prince of Songkla University, and one expert from the ICDDR, Bangladesh. All experts were skillful in the specific area of pediatrics. The expert team assessed and evaluated the content validity of the instruments and whether the items were relevant and adequately measured the variables in the study in the Bangladeshi cultural and health care context. The instruments were then further modified in response to the experts' comments and suggestions.

The internal consistency and reliability of the instruments was determined with 20 samples with the same inclusion criteria as the study subjects. The accepted value should be at least .70. Cronbrach's Alpha coefficients for maternal perceptions regarding acute diarrhea of children was .94 and maternal preventive behaviors regarding acute diarrhea of children was .84.

Data Collection

Before collecting data, the researcher asked for written permission to do so from the Faculty of Nursing, Prince of Songkla University (PSU) and the Director of

the International Center for Diarrheal Diseases Research Bangladesh (ICDDRDB). After getting the written permission, verbal permission was asked from the ward head nurse (in-charge) and mothers for collecting the data. Data were collected carefully by using structured questionnaires. For those mothers who could read, the researcher gave them the questionnaires to answer. For those unable to read, the researcher read the questions to the mothers and asked them for their responses. The questionnaire was checked to ensure all answers were complete. Data were collected during November, 2009 to January, 2010. After collecting data from all subjects, the researcher reviewed all data and analyzed the data of the study.

Ethical Considerations

The human rights of the subjects were respected in this study. Each eligible subject was individually approached. The researcher explained the study objectives, the data collection process, the expected research outcomes, subject's rights, the type of questionnaire, the length of time for completing the questionnaire and the right to refuse to participate in this study. The subjects who agreed to participate in this study were reassured that the data would be kept confidential and reported as group data. The participant's names were not used in any publication or presentation related to this study (Appendix B).

Data Analysis

The data were analyzed by using a computer program related to the objectives of the study. Before data analysis, all data were entered, checked and cleaned using each subject's original questionnaire to ensure accuracy of data entry. Data relating to

demographic characteristic were analyzed and presented using descriptive statistics such as frequencies, percentages, means, and standard deviations. The Pearson correlation was used for examining the relationships among the perceived susceptibility to acute diarrhea, the perceived severity of acute diarrhea, the perceived benefits of practice, the perceived barriers to practice, and the total maternal perceptions and total maternal preventive behaviors regarding acute diarrhea in children. Before undertaking an analysis of the relationships the researcher examined all the assumptions of the Pearson product-moment correlation, namely normality and the linear relationship of the variables. In this study one sample was found to be an outlier. Therefore, this sample was deleted. After this deletion, the assumptions were met.

CHAPTER 4

RESULTS AND DISCUSSION

The Health Belief Model (HBM) was used as a conceptual framework in this study. The main concepts were maternal perceptions and maternal preventive behaviors regarding acute diarrhea of children. The study aimed to assess the level of maternal perceptions and maternal preventive behavior and examine the relationship between maternal perceptions and preventive behaviors regarding acute diarrhea of children. The sample of the study was composed of 107 mothers of children aged 2 months to 5 years whose children admitted with diarrhea at the International Centre for Diarrhoeal Diseases Research, Bangladesh (ICDDR) at Dhaka city in Bangladesh. Data were entered and processed by using computer software.

Results

The results are presented based on the purposes of the study as follows:

Part I: Demographic information of children and mothers; Part II: Maternal perceptions and maternal preventive behaviors regarding acute diarrhea of children; Part III: Relationship between maternal perceptions and maternal preventive behaviors regarding acute diarrhea of children.

Demographic Information of Children and Mothers

Children. As shown in Table 1, approximately 67 percent of the diarrheal children in this study were in the age group of 2-12 months with a mean age of 12.63

months (SD = 9.37, Min = 2, Max = 60). More male children (74.8 %) were affected by diarrhea. The majority of the children (65.4 %) took breastfeeding or formula feeding with solid food.

Table 1

Frequency and Percentage of Children, Classified by Personal Characteristics
(N = 107)

Personal Characteristic	Frequency (n)	Percent (%)
Child age (Months) M =12.63, SD = 9.37, Min - Max = 2- 60 months		
2-12	72	67.3
13-24	28	26.2
25-36	4	3.7
37-60	3	2.8
Gender		
Male	80	74.8
Female	27	25.2
Types of child feeding		
Exclusive breastfeeding	7	6.5
Formula feeding	5	4.7
Breastfeeding + formula feeding	17	15.9
Breastfeeding/formula + solid food	70	65.4
Solid food	8	7.5

Mothers. Table 2 presents the frequency and percentages of the mothers, classified by personal characteristics. The mothers' mean age was 23.63 years (SD = 4.21, Min-Max = 16-35). Most of the mother were Muslim (94.4%), the rest of them were Hindu. Nearly 88 percent of mothers were housewives; the mean family income

was 10,639 Taka (151.98 US \$). With regard to their educational levels, more than 50 percent of the mothers had secondary level education (54.2 %). The source of water was a tube-well (51.4%) and tap water (44.9%). Toilet facilities were VIP (ventilated improved pit latrine) and water seal and traditional pit latrines each with the same percentage (34.6 %).

Table 2

Frequency and Percentage of Mothers, Classified by Personal Characteristics (N=107)

Personal Characteristic	Frequency (n)	Percent (%)
Maternal age (year) M = 23.63, SD = 4.21, Min - Max = 16 - 35 years		
16-22	47	43.9
23-29	47	43.9
30-35	13	12.2
Religion		
Islam	101	94.4
Hindu	6	5.6
Education level		
No formal education	18	16.8
Primary	26	24.3
Secondary	58	54.2
Higher secondary	4	3.8
Bachelor	1	0.9

Table 2 (Continued)

Personal Characteristic	Frequency (<i>n</i>)	Percent (%)
Occupation		
Housewife	94	87.9
Labor	10	9.3
Private employment	3	2.8
Monthly Family income (Taka) M = 10,639, SD = 7650.83, Min-Max = 3,000 - 50,000		
> 5,000	27	25.2
5,001-10,000	51	47.7
10,001-15,000	9	8.4
15,001-20,000	12	11.2
> 20,000	8	7.5
Water sources		
River/ Pond/Lake	4	3.7
Tube well	55	51.4
Tap water	48	44.9
Toilet facilities		
Flush toilet	4	3.7
Pour flush toilet	25	23.4
VIP (ventilated improved pit latrine)	4	3.7
VIP and water seal	37	34.6
Traditional pit latrine	37	34.6

Maternal Perceptions and Maternal Preventive Behaviors

Maternal perceptions. Table 3 presents the maternal perceptions regarding acute diarrhea of children. Overall, maternal perceptions were at a high level ($M = 3.83$, $SD = 0.36$). Three of four subscales were at high levels. These were: perceived susceptibility to diarrhea, perceived severity of diarrhea and perceived benefits of practice ($M = 3.83$, $SD = 0.53$, $M = 4.22$, $SD = 0.55$ and $M = 4.17$, $SD = 0.51$, respectively). The perceived barriers to practice was at a moderate level ($M=3.08$, $SD = 0.71$).

Table 3

Mean and Standard Deviation of Maternal Perceptions Regarding Acute Diarrhea of children (N =107)

Maternal Perceptions	M	SD	Level
Perceived susceptibility regarding acute diarrhea	3.83	0.53	High
Perceived severity regarding acute diarrhea	4.22	0.55	High
Perceived benefits of practice	4.17	0.51	High
Perceived barriers of practice	3.08	0.71	Moderate
Overall, maternal perceptions	3.83	0.36	High

Maternal preventive behaviors. The overall maternal preventive behaviors was at a moderate level ($M = 2.60$, $SD = 0.53$). The maternal preventive behavior had four subscales, two of which, hygiene practice and child feeding practice, were both at a high level ($M = 2.82$, $SD = 0.48$, $M = 2.71$, $SD = 0.65$). The other two subscales,

safe water practice and defecation practice, were both at a moderate level ($M = 2.65$, $SD = 0.74$, $M = 2.19$, $SD = 0.94$). These results are shown in Table 4.

Table 4

Mean and Standard Deviation of Maternal Preventive Behaviors Regarding Acute Diarrhea of children (N =107)

Maternal Preventive Behaviors	M	SD	Level
Hygiene practice both mother and child	2.82	0.48	High
Child feeding practice	2.71	0.65	High
Safe water practice	2.65	0.74	Moderate
Defecation practice	2.19	0.94	Moderate
Overall maternal preventive behaviors	2.60	0.53	Moderate

Relationship between Maternal Perceptions and Maternal Preventive Behaviors Regarding Acute Diarrhea of Children

Pearson product moment correlation was used to test the relationship between maternal perceptions and maternal preventive behavior. It was found that there was a significantly moderate and positive correlation between maternal perceptions and maternal preventive behaviors ($r = .60$, $p < .01$). The perceived severity of diarrhea was also moderately correlated with maternal preventive behaviors ($r = .55$, $p < .01$). The perceived susceptibility to diarrhea and perceived benefits of practice were correlated with maternal preventive behaviors ($r = .30$, $p < .01$, $r = .48$, $p < .01$ respectively). There was no significant correlation between perceived barriers to practices and maternal preventive behaviors. The results are shown in Table 5.

Table 5

Pearson's Correlation Matrix Between Maternal Perceptions and Maternal Preventive Behaviors Regarding Acute Diarrhea of Children (N =106)

Variables	1	2	3	4	5	6
1 Perceived susceptibility to acute diarrhea	1					
2 Perceived severity of acute diarrhea	.24*	1				
3 Perceived benefits of practice	.17	.64**	1			
4 Perceived barrier to practice	.02	-.07	-.03	1		
5 Total maternal perceptions	.46**	.68**	.69**	.56**	1	
6 Total maternal preventive behavior	.30**	.55**	.48**	.19	.60**	1

p < 0.05 level (2-tailed). ** p < 0.01 level (2-tailed).

Discussion

Demographic Characteristics of Children and Mothers

In this study, more than half (67.3%) of diarrheal children were infants. It may be because an infant's immunological organs are immaturely developed during the first year of life (PATH, 2008). Hence they are susceptible to infection. In addition infants are at greatest risk of diarrheal disease when foods other than breast milk are given. They lose the protection of breast milk's anti-infective properties and are more likely to be exposed to food and water-borne pathogens. Alternatives to

breast milk carry risks, particularly in areas where infectious disease levels and the possibility for improper preparation of food and storage practice are high (PATH, 2008). More male children suffered from diarrhea than females possibly because female children were ignored by their parents. They might not be taken to the hospital even when they got diarrhea since male children were preferred by parents in Bangladesh. This situation is commonly found in cultures where sons are considered as an economic asset (Akhter, n.d). The majority of children received breastfeeding and formula feeding with solid food. This may be due to the fact that Muslim mothers (94.4%) try to maintain privacy when breast feeding. In the Islamic belief the women's breasts must be covered at all times in front of those who are not close family members, thus Muslim women may be prompted to use formula-feed or bottle-feed expressed breast milk to their infants (Shaikh & Ahmed, 2006).

The majority of mothers in this study were in the young age group ($M = 23.63$ year). This is because in the Bangladesh context females experience early marriage, and the mean marriage age was 20.2 year in 1998 (Hossain & Yousuf, 2001). Bangladeshi law prohibits marriage before the age of 18 years for girls, but in reality many girls marry before 18 years of age. Child marriage is a violation of human rights, compromising the development of girls and often resulting in early pregnancy (BBS, Bangladesh Bureau of Statistics UNICEF, United Nations Children's Fund, 2007). The sample age groups in this study were similar to the studies of Pancharuniti et al, (2004) and Sripituk (2006) whose studies were done in Vietnam and Thailand. The education levels of mothers in this study were at a secondary level because the age specific marriage rates show a concentration of married females in the age group

of 15-19 years. This covers secondary or higher secondary school ages (Hossain & Yousuf).

Nearly 90 percents were housewives. This might be because Bangladesh is a male dominated country, and the majority of people live in an extended family. The family members do not like women going out to work as they want women to be mothers to maintain the family as well as taking care of their children. Efroymsen, Biswas, and Ruma's (2007) study in Bangladesh presented background information and research relating to the economic condition of women through their unpaid work. The results indicate that the daily work performed by women, included household tasks and farming for which they received no pay. In Bangladeshi families, income earning is usually the responsibility of males, while the remaining family members, usually women and children, are economically dependent. This dependent condition is due to their relatively lower educational levels and lack of profitable skills. This results in the lack of available employment opportunities for women to earn money for a living. This also shows a lack of social acceptance for such practice. This problem was, unexpectedly, particularly acute for middle-class women. Middle-class women however, faced the greatest social obstacles in engaging in work outside the home, leaving them few choices but to be full-time housewives (Efroymsen, Biswas, & Ruma, 2007).

The mean of monthly family income was 10,639 Taka (151.98 US\$). The source of water came from tube wells (51.4%) and tap water (44.9%). After independence in 1971, the Government of Bangladesh emphasized the rehabilitation of damaged water supplies and sanitation services and the fixing of new facilities through the department of public health engineering. Starting from independence,

more than 1.2 million tube wells and hand-pumps were drilled and installed in the rural areas and 7 to 8 times more wells have been installed by private individuals. Only in a few municipalities do piped water systems exist while urban areas without piped water, which covers the majority of municipalities, heavily depend on tube-wells (MLG, 2008).

Mostly of the study subjects had ventilated improved pit latrines, water seals and traditional pit latrines respectively. Urban sanitation is a major challenge in Bangladesh. In 2003 the Government of Bangladesh set a national goal of 100 percent sanitation coverage by the year 2010, and started a campaign by promoting awareness, and starting construction. The national sanitation strategy of 2005 suggested installing low cost sewerage systems in urban areas. The present national sanitation campaign in rural and urban area focuses on the promotion of pit latrines (MLG, 2008).

Maternal Perceptions Regarding Acute Diarrhea of Children

From Table 3 it can be seen that, overall, maternal perceptions were at a high level ($M = 3.83$, $SD = 0.36$). This was because three subscales out of the four of perceptions (susceptibility, severity, benefit) were all at high levels ($M = 3.83$, $SD = 0.53$; $M = 4.22$, $SD = 0.55$; $M = 4.17$, $SD = 0.51$; $M = 3.08$, $SD = 0.71$, respectively). Only the perceived barriers were at a moderate level. The results were similar to the study of Sripituk (2006) who also found maternal perceptions were at high levels, but perceived barriers was low.

Mothers perceived their children were susceptible to diarrhea at a high level. This was because most of the children in this study were infants (67.3%) and it was

observed by the researcher that most of diarrheal children admitted at this hospital were less than five years old. Almost all mothers (94.4%) perceived that poor hygienic practice causes child deaths. More than half of the mothers perceived that children under 5 years got diarrhea easily (63.6%), and malnourished children diarrhea even more easily (57.9%) (Appendix C, Table 6). Pancharuniti et al (2004) also found that most of the subjects (81.9%) perceived that malnutrition could cause severe diarrhea. Mothers perceived the severity of diarrhea to be at the high level. This was because when all children in this study were first admitted in hospital they might have felt fear about their child's death. More than 90 percents of mothers perceived that diarrhea was a serious disease (96.3%), that diarrhea could cause dehydration (93.5%), and severe diarrhea might be a cause of child death (89.7%) (Appendix C, Table 8).

Mothers perceived the benefits of practice also at a high level. Most of the mothers perceived that washing hands was an important practice to prevent diarrhea (97.2%), and so was the immediate disposal of children's excreta (93.5%). Other preventative benefits to preventing children from getting diarrhea were boiling drinking water (83.2%), and defecating in a toilet (80.3%) (Appendix C, Table 8). The mothers' perceived barriers to practice were at a moderate level. Most of the mothers disagreed about inadequate water for washing hands (83.1%), and the proper cleaning of feeding bottles by boiling was difficult to practice (78.5%). Safe feces disposal was seen as inconvenient (68.2%), and less than 50 percent agreed that toilet facilities were expensive (48.6%). Exclusive breastfeeding was also perceived as inconvenient (42.1%) (Appendix C, Table 8).

Maternal Preventive Behaviors Regarding Acute Diarrhea of Children

Table 4 shows that the overall maternal preventive behaviors level was at a moderate level ($M = 2.60$, $SD = 0.53$). This is because of the four subscales two of them, hygiene practice and child feeding practice, were at high levels ($M = 2.82$, $SD = 0.48$, $M = 2.71$, $SD = 0.65$). However, the other two subscales, safe water practice and defecation practices, were at a moderate levels ($M = 2.65$, $SD = 0.74$, $M = 2.19$, $SD = 0.94$). Hygienic practice was at high level because the study found that every mother always washed their hands after defecation (100%), after the disposal of child's feces (93.4%); before feeding a child (91.6%); and before preparing food (79.5%) (Appendix C, Table 9). Child feeding practice was also at a high level. This might be because most of mothers used lids to cover food (96.3%), washed utensils before preparing a child's food (93.5%), and mothers never kept the remaining milk so that the child had all of it (92.5%) (Appendix C, Table 9). Maternal preventive behaviors about hygiene practices and child feeding practices were at a high level. This might be the because of the health education provided by health workers in hospitals. These two topics were given emphasis by the mass media during an outbreak of diarrhea.

Safe water practices and defecation practices were at moderate levels. Safe water practices and defecation practices are still health problems in Bangladesh because infrastructure is lacking. Children are most likely to be exposed to water contaminated with pathogens (PATH, 2008). In this study, half of the mothers (54.2%) never used boiled water for drinking and cleaned their utensils with ground water (47.6%) (Appendix C, Table 9). Regarding defecation practices, defecation in the open ground has been a common socio-cultural practice both in rural and urban

areas (MLG, 2008). The study found that 98 percent of the children in this study still defecated in open fields. More than half of the mothers (57.9%) never disposed of feces in toilets before cleaning the diapers (Appendix C, Table 9). This might be because of a generally common belief amongst people that children's feces were not very harmful. As a result, they were not careful about the safe disposal of children's feces. After children had defecated, mothers usually threw out the feces into drains, garbage pits and open places (MLG, 2008).

Relationship Between Maternal Perceptions and Maternal Preventive Behaviors

From Table 5 it can be seen that there was a statistically positive moderate correlation between maternal perceptions and maternal preventive behaviors. This was in accord with the HBM which reported that people will take action to avoid threats depending on their perceptions (Strecher & Rosenstock, 1997). It meant that maternal preventive behaviors depended on their perceptions. The results of this study were similar to Pancharuniti et al.'s study (2004). This found that the maternal perceptions of susceptibility, severity of acute diarrhea, benefits of and barriers to practices on maternal home care for childhood diarrhea were significantly correlated to mothers' practices. With regards to the relationship between the subscales of maternal perceptions of maternal preventive behaviors, three of the four subscales of maternal perceptions (perceived susceptibility, perceived severity and perceived benefits) were also statistically correlated to maternal preventive behaviors. Perceived barriers were the exception.

Perceived susceptibility related to maternal preventive behaviors because mothers perceived their children to be at risk from diarrheal diseases. Thus they

practiced preventive behaviors in order to prevent their children from getting diarrheal diseases. The greater the perceived risk, the greater the likelihood that mothers would engage in behavior to decrease the risk (Strecher & Rosenstock, 1997).

Perceived severity related to maternal preventive behaviors because mothers perceived that diarrhea was a serious disease and their children were at risk from diarrheal disease. This was why they performed preventive behaviors. When the perception of susceptibility was combined with severity, it resulted in a perceived threat. The reason people changed their behaviors was based on the perception of the threat of a fatal disease (Strecher & Rosenstock, 1997).

Perceived benefits were also found to be related to maternal preventive behavior because mothers perceived the benefits of preventive behaviors, and so adopted preventive behavior. They believed that preventive behaviors can decrease the chances of their children getting diarrheal disease (Strecher & Rosenstock, 1997). It was interesting to find that perceived barriers did not relate to preventive behavior. Many previous studies had indicated that perceived barriers were most significant in determining changes in health behavior (Strecher & Rosenstock, 1997). This may be because mothers perceived their ability (perceived self-efficacy) to perform preventive behaviors, therefore their preventive behaviors practices did not relate to their perception of the barriers to practices. It had been reported that the lack of self-efficacy was strongly related to the barriers component of the HBM (Strecher & Rosenstock, 1997). Unfortunately perceived self-efficacy was not included in this study. It cannot be determined whether perceived self-efficacy had any effect on the relationship between perceived barriers and preventive behaviors.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

This correlational descriptive study was designed to determine the level of maternal perceptions and maternal preventive behaviors and explore the relationship between the maternal perceptions and maternal preventive behaviors using the HBM. This study was conducted at the ICDDR hospital Dhaka, Bangladesh. The sample in this study consisted of mothers of children aged under five years of age who had been admitted with diarrhea.

The total number of respondents in the study was 107. The human rights and anonymity were strictly maintained throughout the data collection process. A purposive sampling technique was used to recruit the samples. The participation in this study was completely voluntary. The data were collected during November 2009 to January 2010. A set of questionnaires was used to collect data.

A pilot study was conducted to test the reliability of the questionnaires before collecting the data. The reliability scores were .94 and .84 for the maternal perceptions questionnaire and the maternal preventive behaviors questionnaire, respectively. The data were processed for analysis by using computer software.

Demographic data were analyzed by frequency and percentage. The scores of the overall maternal perceptions and its subscales were calculated for mean and standard deviations. These subscales consisted of the perceived susceptibility, perceived severity, perceived benefits and perceived barriers and overall maternal preventive behaviors (such as hygienic practices, child feeding practices, safe water practices and defecation practices). The relationships between the maternal

perceptions and its subscales and maternal preventive behaviors were tested by the Pearson correlation.

Summary of the Study Findings

The majority of the samples were in the young age group and their children were mostly infants (67.3%) and males (74.8%). The children were mainly fed with mixed feeding (breastfeeding and formula feeding and solid food 65.4%). The largest group of mothers were Muslim (94.4%), housewives (87.9%), with secondary level education (54.2%), and family incomes were 5,001-10,000 Taka/month (71.44-142.85 US\$) (47.7%). They mostly (51.4%) used tube well water as a water source. Toilet facilities were ventilated improved pit latrines and water seals, and traditional pit latrines, each with the same percentage (34.6%).

Overall, the maternal perceptions were at a high level ($M = 3.83$, $SD = 0.36$). Three of the four subscales were at high levels; these were perceived susceptibility to diarrhea, perceived severity of diarrhea, and perceived benefits of practice ($M = 3.83$, $SD = 0.53$, $M = 4.22$, $SD = 0.55$, $M = 4.41$, $SD = 0.64$ respectively). The perceived barriers to practice was at a moderate level ($M = 3.08$, $SD = 0.71$).

The average score of overall maternal preventive behaviors was at a moderate level ($M = 2.60$, $SD = .53$). The maternal preventive behaviors had four subscales, two of which, hygienic practices and child feeding practices, were at high levels ($M = 2.82$, $SD = 0.48$, $M = 2.71$, $SD = 0.65$). The other two subscales, safe water practices and defecation practices, were at moderate levels ($M = 2.65$, $SD = 0.74$, $M = 2.19$, $SD = 0.94$).

Pearson's Correlation was used to investigate the relationship between maternal perceptions and maternal preventive behaviors. It was found that there was a significant moderate correlation between maternal perceptions and maternal preventive behaviors ($r = .60, p < .01$). The perceived severity of diarrhea was also moderately correlated to maternal preventive behaviors ($r = .55, p < .01$). Perceived susceptibility to diarrhea and perceived benefits of practices were weakly correlated with maternal preventive behaviors ($r = .30, p < .01, r = .48, p < .01$ respectively). There was no significant correlation between perceived barriers to practices and maternal preventive behaviors.

Strengths of the Study

The findings of this study provide a comprehensive understanding regarding maternal perceptions and preventive behaviors of children with diarrhea based on the Health Belief Model. This has not been studied or used before in Bangladesh. The findings should help to guide nurses and health personnel to develop an intervention program for promoting maternal perceptions and preventive behaviors regarding diarrheal diseases.

Limitations of the Study

This study has some limitations:

1. The study was carried out only in a diarrheal diseases hospital, thus the results of the study cannot be generalized to other settings in Bangladesh.

2. Most of the diarrheal children in this study were under two years old (93.5%), therefore the results of the study may not be representative of children under five years of age.

Implications and Recommendations

The findings of this study provide several implications for the curriculum of nursing education and nursing practice. It points the way to future research in promoting mothers' perceptions as well as their preventive behaviors regarding acute diarrhea of children in the context of Bangladesh.

Nursing education. The findings of this study showed a relationship between maternal perceptions and maternal preventive behaviors regarding acute diarrhea of children. So maternal perceptions based on the HBM should be implemented in the nursing curriculum. It could help nursing students to be able to promote maternal perceptions and preventive health behaviors in order to reduce the incidence of diarrhea.

Nursing practice. The findings and knowledge of this study should provide evidence for the clinical practice of nurses in promoting mothers' perceptions as well as their preventive behavior regarding acute diarrhea in children. Health education about diarrheal disease should focus on the mothers whose children are under two years old, especially infants. Mothers of infants should be encouraged to breastfeed their infants in the first six months of life and continue with breastfeeding up to 24 months. Health education content should focus on the seriousness of diarrheal disease, the susceptibility of infants to diarrhea and the benefits of maternal preventive

behaviors. There is need to emphasize defecation practices, safe water practices, and child feeding practices to prevent children from getting diarrhea.

Nursing research. This study should be duplicated with perceived self-efficacy added. The demographic characteristic in the conceptual framework of future studies should help to explain more about the factors influencing maternal preventive behaviors. The study topic should be extended to other health problems in children such as pneumonia. Experimental interventions should plan to study the next step to modify maternal perceptions and maternal preventive health behavior.

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APPENDICES

Part II: Maternal Perceptions Regarding Acute Diarrhea of Children Questionnaire.

Description: Listen carefully to each statement then select the best answer as your opinion. There are no rights or wrong answers. Do not spend too much time on any one statement but give the answer which seems best to you. These directions will be used in both the Part II and Part III questionnaires. The researcher will make a tick (✓) at the ranking scale on the answer provide by participants. The ranking used is: strongly agree=5, agree=4, not certain=3, disagree=2, strongly disagree=1.

Maternal Perceptions	Strongly disagree	Disagree	Not certain	Agree	Strongly agree
	1	2	3	4	5
Perceived susceptibility to acute diarrhea					
1. Children under 5 years old easily get diarrhea	1	2	3	4	5
2. If my child has malnutrition, my child will be easily to have diarrhea	1	2	3	4	5
3. If my child is unhealthy, he/she may die from severe diarrhea	1	2	3	4	5
4. Poor hygiene practice can cause diarrhea for children	1	2	3	4	5
Perceived severity of acute diarrhea					
1. Diarrhea is a serious disease	1	2	3	4	5
2. Chronic diarrhea increases the risk of malnutrition	1	2	3	4	5
3. Severe diarrhea may be a cause of death for the child	1	2	3	4	5
4. Chronic diarrhea has an adverse effect on development of the child	1	2	3	4	5
5. Diarrhea can cause dehydration in the child	1	2	3	4	5

Part II (Continued)

Maternal Perceptions	Strongly disagree	Disagree	Not certain	Agree	Strongly agree
Perceived benefits of practice					
1. Washing hand is an important practice to prevent diarrhea	1	2	3	4	5
2. Exclusive breastfeeding for 6 months can prevent children from getting diarrhea.	1	2	3	4	5
3. Proper cleaning the feeding bottle or utensils can prevent children from getting diarrhea	1	2	3	4	5
4. Boiling drinking water can prevent children from getting diarrhea	1	2	3	4	5
5. Defecation in the toilet can prevent children from the contamination of diarrhea	1	2	3	4	5
6. Immediately dispose of children excreta can prevent transmission of diarrhea	1	2	3	4	5
Perceived barriers of practice					
1. Inadequate of water for washing hands	5	4	3	2	1
2. Exclusive breastfeeding is inconvenient for me	5	4	3	2	1
3. Proper cleaning of the feeding bottle by boiling is difficult to practice	5	4	3	2	1
4. Safety drinking water is expensive for me	5	4	3	2	1
5, Toilet facilities are expensive (resources) for me	5	4	3	2	1
6. Safe feces disposal is inconvenient for me	5	4	3	2	1

Part III: Maternal Preventive Behaviors Regarding Acute Diarrhea of children
Questionnaire.

The researcher will make a tick (√) on the ranking scale for the participants answer. The ranking used is: always = 4, very often = 3, often = 2, sometime = 1, never = 0. (always = at all times; very often = more frequently but not at all times; often = frequently but not more frequently; sometimes = once in a while or more; never = not at any time or not once)

Maternal Preventive Behaviors	Never	Sometime	Often	Very often	Always
Hygiene practice both mother and child					
1. Washing the child's hands before eating	0	1	2	3	4
2. Washing the child's hands after defecation	0	1	2	3	4
3. Washing the child's hands after playing in the play ground	0	1	2	3	4
4. Washing the mother's hands before preparing food	0	1	2	3	4
5. Washing the mother's hands before feeding the child	0	1	2	3	4
6. Washing the mother's hands after defecation	0	1	2	3	4
7. Washing the mother's hands after dispose of child's feces	0	1	2	3	4
8. Washing the mother's hands after changing diaper	0	1	2	3	4
9. Use soap to wash hands	0	1	2	3	4

Part III (Continued)

Maternal Preventive Behaviors	Never	Sometime	Often	Very often	Always
Child feeding practice					
1. Use lids to cover food	0	1	2	3	4
2. Feeding freshly cooked food to the child	0	1	2	3	4
3. Wash utensils before preparing child's food	0	1	2	3	4
4. Wash raw fruits before giving them to the child	0	1	2	3	4
5. Cleaning a feeding bottle by boiling at least once a day	0	1	2	3	4
6. Use hot water for cleaning a feeding bottle	4	3	2	1	0
7. Keep the remaining milk until the child has all of it	4	3	2	1	0
Safe water practice					
1. Using boiling water for drinking	0	1	2	3	4
2. Covering water container / pitchers	0	1	2	3	4
3. Cleaning water container / pitchers at least once a day	0	1	2	3	4
4. Cleaning the utensils with river/ponds/lake water	4	3	2	1	0
5. Cleaning the utensil with ground water (tube well)	0	1	2	3	4
Defecation practice					
1. Child defecate in a toilet	0	1	2	3	4
2. Child defecate in an open field	4	3	2	1	0
3. Child defecate in a diaper / cloths	4	3	2	1	0
4. Disposal of the child feces in the toilet	0	1	2	3	4
5. Disposal of feces in a toilet before cleaning a diaper	0	1	2	3	4
6. Wash child diaper in the open field	4	3	2	1	0
7. The child's stool and bottom are cleaned immediately after defecation	0	1	2	3	4

Appendix B
Informed Consent Form

Participants ID

Dear participant,

I am Tapati Rani Kundu, a Masters nursing student in the international program, Faculty of Nursing, Prince of Songkala University (PSU), Hat-Yai, Thailand. I am also a registered nurse at the National Institute of Cardio Vascular Diseases Hospital (NICVD), Dhaka, Bangladesh. I am conducting a Master degree research for my study. This study being conducted in co-operation with International Centre for Diarrheal Diseases Research, Bangladesh (ICDDRDB) communications and Prince of Songkla University in order to learn more about “Relationship Between Maternal Perceptions and Preventive Behaviors Regarding Acute Diarrhea of Children in Bangladesh”. The aims of the study are to determine the level of maternal preventive behaviors, the level of maternal perceptions and to examine the relationship between maternal perceptions and preventive behaviors regarding acute diarrhea of children. The information will be collected and analyzed for writing a report. The report will provide information about maternal preventive behaviors and the relationship between maternal perceptions and preventive behaviors. This is fulfilling the requirement of the Master’s of nursing program of the Faculty of Nursing, Prince of Songkla University, Hat Yai, Thailand.

If you agree to participate in this study, you will be asked to complete a set of questionnaire form. It will take around 15-20 minutes of your time. All of your responses and providing information will be used only for the purpose of this

research. All identifiable information will be destroyed after the completion of this study.

There is no risk from participating in this study. Your participation is voluntary in nature; you may withdraw from this study in any time. There will be no penalty or any affect if you decide to refuse to participate. More over, you will be needed to sign your name under the heading

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(Name of participant)

(Signature of participant)

Date

(Name of researcher)

(Signature of researcher)

Date

Appendix C

Maternal Perceptions and Maternal Preventive Behaviors

Table 6

Mean and Standard Deviation of Maternal Perceptions Regarding Acute Diarrhea of Children (N=107)

Maternal Perceptions	M	SD	Level
Perceived susceptibility to diarrhea	3.83	0.53	High
1. Children under 5 years old easily get diarrhea	3.86	0.86	High
2. If my child has malnutrition, my child will be easily to have diarrhea	3.59	0.81	Moderate
3. If my child is unhealthy, he/she may die from severe diarrhea	3.47	0.84	Moderate
4. Poor hygiene practice can cause diarrhea for children	4.43	0.69	High
Perceived severity of diarrhea	4.22	0.55	High
1. Diarrhea is a serious disease	4.62	0.56	High
2. Chronic diarrhea increases the risk of malnutrition	3.98	0.88	High
3. Severe diarrhea may be a cause of death for the child	4.22	0.70	High
4. Chronic diarrhea has an adverse effect on development of the child	3.90	0.87	High
5. Diarrhea can cause dehydration in the child	4.41	0.64	High

Table 6 (Continued)

Maternal Perceptions	M	SD	Level
Perceived benefits of practice	4.17	.51	High
1. Washing hand is an important practice to prevent diarrhea	4.77	.49	High
2. Exclusive breastfeeding for 6 months can prevent children from getting diarrhea	3.83	.95	High
3. Proper cleaning the feeding bottle or utensils can prevent children from getting diarrhea	3.91	.80	High
4. Boiling drinking water can prevent children from getting Diarrhea	4.09	.73	High
5. Defecation in the toilet can prevent children from the contamination of diarrhea	4.12	.83	High
6. Immediately dispose of children excreta can prevent transmission of diarrhea	4.31	.62	High
Perceived barriers of practice	3.08	.71	Moderate
1. Inadequate of water for washing hand	1.45	.89	Low
2. Exclusive breastfeeding is inconvenient for me	3.30	1.47	Moderate
3. Proper cleaning of the feeding bottle by boiling is difficult to practice	4.37	1.13	High
4. Safety drinking water is expensive to me	2.75	1.44	Moderate
5. Toilet facilities are expensive (resources) to me	2.66	1.39	Moderate
6. Safe feces disposal is inconvenient to me	3.95	1.46	High
Overall maternal perceptions	3.83	.36	High

Table 7

Mean and Standard Deviation of Maternal Preventive Behaviors Regarding Acute Diarrhea of Children (N =107)

Maternal Preventive Behaviors	M	SD	Level
Hygienic practice both mother and child	2.82	0.48	High
1. Washing the child's hands before eating	1.38	1.41	Moderate
2. Washing the child's hands after defecation	1.49	1.43	Moderate
3. Washing the child's hands after playing in the play ground	2.15	1.51	Moderate
4. Washing the mother's hands before preparing food	3.36	1.16	High
5. Washing the mother's hands before giving child feeding	3.63	0.84	High
6. Washing the mother's hands after defecation	4.00	0.00	High
7. Washing the mother's hands after dispose of child's feces	3.81	0.60	High
8. Washing the mother's hands after changing diaper	2.95	1.22	High
9. Use soap to wash hands	2.61	1.21	Moderate
Child feeding practice	2.71	0.65	High
1. Use lids to cover food	3.66	0.54	High
2. Feeding freshly cooked food to the child	2.33	1.19	Moderate
3. Wash utensils before preparing child's food	3.70	0.80	High
4. Wash raw fruits before giving them to the child	2.48	1.31	Moderate
5. Cleaning a feeding bottle by boiling at least once a day	2.05	1.88	Moderate
6. Use hot water for cleaning a feeding bottle	.95	1.49	Low
7. Keep the remaining milk until the child has all of it	3.80	0.74	High

Table 7 (Continued)

Maternal Preventive Behaviors	M	SD	Level
Safe water practice	2.65	0.74	Moderate
1. Using boiling water for drinking	1.38	1.68	Moderate
2. Covering water container / pitchers	3.49	0.85	High
3. Cleaning water container / pitchers at least once a day	2.69	1.61	High
4. Cleaning the utensils with river/ponds/lake water	3.64	1.06	High
5. Cleaning the utensil with ground water (tube well)	2.04	1.97	Moderate
Defecation practice	2.19	0.94	Moderate
1. Child defecate in a toilet	1.56	1.53	Moderate
2. Child defecate in an open field	2.84	1.00	High
3. Child defecate in a diaper/ cloths	2.49	1.26	Moderate
4. Disposal of the child feces in the toilet	2.15	1.64	Moderate
5. Disposal of feces in a toilet before cleaning a diaper	1.41	1.81	Moderate
6. Wash child diaper in the open field	1.42	1.76	Moderate
7. The child's stool and bottom are cleaned immediately after defecation	3.46	0.78	High
Overall maternal preventive behaviors	2.60	0.53	Moderate

Table 8

Frequency and Percentage of Maternal Perceptions Regarding Diarrhea of Children
(N=107)

Maternal Perceptions	Strongly disagree	Disagree	Not certain	Agree	Strongly agree
	n (%)	n (%)	n (%)	n (%)	n (%)
Perceived susceptibility to diarrhea					
1. Children under 5 years old easily get diarrhea	1 (.9)	2 (1.9)	36 (33.6)	40 (37.4)	28 (26.2)
2. If my child has malnutrition, my child will be easily to have diarrhea	3 (2.8)	3 (2.8)	39 (36.4)	52 (48.6)	10 (9.3)
3. If my child is unhealthy, he/she may die from severe diarrhea	4 (3.7)	5 (4.7)	42 (39.3)	49 (45.8)	7 (6.5)
4. Poor hygiene practice can cause diarrhea for children	0	3 (2.8)	3 (2.8)	45 (42.1)	56 (52.3)
Perceived severity of diarrhea					
1. Diarrhea is a serious disease	0	0	4 (3.7)	32 (29.9)	71 (66.4)
2. Chronic diarrhea increases the risk of malnutrition	1 (.9)	7 (6.5)	16 (15.0)	53 (49.5)	30 (28.0)
3. Severe diarrhea may be a cause of death for the child	0	3 (2.7)	8 (7.5)	58 (54.2)	38 (35.5)
4. Chronic diarrhea has an adverse effect on development of the child	1 (.9)	4 (3.7)	28 (26.2)	46 (43.0)	28 (26.2)
5. Diarrhea can cause dehydration in the child	0	1 (.9)	6 (5.6)	48 (44.9)	52 (48.6)

Table 8 (Continued)

Maternal Perceptions	Strongly disagree	Disagree	Not certain	Agree	Strongly agree
	n (%)	n (%)	n (%)	n (%)	n (%)
Perceived benefits of practice					
1. Washing hand is an important practice to prevent diarrhea	0	0	3 (2.8)	19 (17.8)	85 (79.4)
2. Exclusive breastfeeding for 6 months can prevent children from getting diarrhea	0	10 (9.3)	28 (26.2)	39 (36.4)	30 (28.0)
3. Proper cleaning the feeding bottle or utensils can prevent children from getting diarrhea	0	6 (5.6)	21 (19.6)	56 (52.3)	24 (22.4)
4. Boiling drinking water can prevent children from getting diarrhea	0	3 (2.8)	15 (14.0)	58 (54.2)	31 (29.0)
5. Defecation in the toilet can prevent children from the contamination of diarrhea	0	5 (4.7)	16 (15.0)	47 (43.9)	39 (36.4)
6. Immediately dispose of children excreta can prevent transmission of diarrhea	0	1 (.9)	6 (5.6)	58 (54.2)	42 (39.3)
Perceived barriers of practice					
1. Inadequate of water for washing hand	82 (76.6)	7 (6.5)	14 (13.1)	3 (2.8)	1 (.9)
2. Exclusive breastfeeding is inconvenient for me	40 (37.4)	5 (4.7)	21 (19.6)	30 (28.0)	11 (10.3)
3. Proper cleaning of the feeding bottle by boiling is difficult to practice	77 (72.0)	7 (6.5)	13 (12.1)	6 (5.6)	4 (3.7)
4. Safety drinking water is expensive to me	28 (26.2)	23 (21.5)	24 (22.4)	12 (11.2)	20 (18.7)
5. Toilet facilities are expensive (resources) to me	30 (28.0)	22 (20.6)	23 (21.5)	18 (16.8)	14 (13.1)
6. Safe feces disposal is inconvenient to me	63 (58.9)	10 (9.3)	13 (12.1)	8 (7.5)	13 (12.1)

Table 9

Frequency and Percentage of Maternal Preventive Behaviors Regarding Diarrhea of Children (N =107)

Maternal Preventive Behaviors	Never	Some time	Often	Very often	Always
	n (%)	n (%)	n (%)	n (%)	n (%)
Hygienic practice both mother and child					
1. Washing the child's hands before eating	43 (40.2)	19 (17.8)	17 (15.9)	17 (15.9)	11 (10.3)
2. Washing the child's hands after defecation	34 (31.8)	30 (28.0)	16 (15.0)	10 (9.3)	17 (15.9)
3. Washing the child's hands after playing in the play ground	18 (16.8)	28 (26.2)	14 (13.1)	14 (13.1)	33 (30.8)
4. Washing the mother's hands before preparing food	5 (4.7)	6 (5.6)	11 (10.3)	8 (7.5)	77 (72.0)
5. Washing the mother's hands before giving child feeding	2 (1.9)	3 (2.8)	4 (3.7)	14 (13.1)	84 (78.5)
6. Washing the mother's hands after defecation	0	0	0	0	107 (100)
7. Washing the mother's hands after dispose of child's feces	0	2 (1.9)	5 (4.7)	4 (3.7)	96 (89.7)
8. Washing the mother's hands after changing diaper	2 (1.9)	15 (14.0)	24 (22.4)	11 (10.3)	55 (51.4)
9. Use soap to wash hands	0	27 (25.2)	25 (23.4)	17 (15.9)	38 (35.5)

Table 9 (Continued)

Maternal Preventive Behaviors	Never	Some time	Often	Very often	Always
	n (%)	n (%)	n (%)	n (%)	n (%)
Child feeding practice					
1. Use lids to cover food	0	0	4 (3.7)	28 (26.2)	75 (70.1)
2. Feeding freshly cooked food to the child	5 (4.7)	24 (22.4)	32 (29.9)	22 (20.6)	24 (22.4)
3. Wash utensils before preparing child's food	2 (1.9)	3 (2.8)	2 (1.9)	11 (10.3)	89 (83.2)
4. Wash raw fruits before giving them to the child	10 (9.3)	15 (14.0)	29 (27.1)	20 (18.7)	33 (30.8)
5. Cleaning a feeding bottle by boiling at least once a day	44 (41.1)	5 (4.7)	6 (5.6)	5 (4.7)	47 (43.9)
6. Use hot water for cleaning a feeding bottle	70 (65.4)	6 (5.6)	12 (11.2)	4 (3.7)	15 (14.0)
7. Keep the remaining milk until the child have all of it	98 (91.6)	1 (.9)	5 (4.7)	1 (.9)	2 (1.9)
Safe water practice					
1. Using boiling water for drinking	58 (54.2)	5 (4.7)	14 (13.1)	5 (4.7)	25 (23.4)
2. Covering water container / pitchers	2 (1.9)	0	13 (12.1)	21 (19.6)	71 (66.4)
3. Cleaning water container / pitchers at least once a day	20 (18.7)	9 (8.4)	13 (12.1)	7 (6.5)	58 (54.2)
4. Cleaning the utensils with river / ponds / lake water	94 (87.9)	3 (2.8)	2 (1.9)	1 (.9)	7 (6.5)
5. Cleaning the utensil with ground water (tube well)	50 (46.7)	1 (.9)	3 (2.8)	1 (.9)	52 (48.6)

Table 9 (Continued)

Maternal Preventive Behaviors	Never	Some time	Often	Very often	Always
	n (%)	n (%)	n (%)	n (%)	n (%)
Defecation practice					
1. Child defecate in a toilet	43 (40.2)	14 (13.1)	13 (12.1)	21 (19.6)	16 (15.0)
2. Child defecate in an open field	2 (1.9)	10 (9.3)	21 (19.6)	44 (41.1)	30 (28.0)
3. Child defecate in a diaper/ cloths	22 (20.6)	44 (41.1)	18 (16.8)	10 (9.3)	13 (12.1)
4. Disposal of the child feces in the toilet	31 (29.0)	7 (6.5)	20 (18.7)	12 (11.2)	37 (34.6)
5. Disposal of feces in a toilet before cleaning a diaper	62 (57.9)	6 (5.6)	4 (3.7)	3 (2.8)	32 (29.9)
6. Wash child diaper in the open field	30 (28.0)	4 (3.7)	5 (4.7)	10 (9.3)	58 (54.2)
7. The child's stool and bottom are cleaned immediately after defecation	0	1 (.9)	16 (15.0)	23 (21.5)	67 (62.6)

Appendix D

List of Content Validators

Three experts have examined the content validity of the demographic information, maternal perceptions and maternal preventive behaviors questionnaire regarding acute diarrhea of children

1. Asst. Prof. Dr. Busakorn Punthmatharith
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Hat-Yai, Thailand.

2. Asst. Prof. Dr. Wantanee Wiroonpanich
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3. Dr. Azharul Islam Khan (MD)
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Appendix E

List of Translators

Three experts have back translated the study interment. They are listed:

1. English to Bengli translator

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2. Back translator

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Scientist (ICDDR)

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3. Compared by

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