Risk Factors of Diarrhea Disease among Under Five in Ibrahim Malik Teaching Hospital, Khartoum state – Sudan 2017

By:
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B.Sc. Nursing (IUA)
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Risk Factors of Diarrhea Disease among Under Five in *Ibrahim Malik* Teaching Hospital, Khartoum state – Sudan 2017

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قال الله تعالى:

(وَنُنَزِّلُ مِنَ الْقُرْآنِ مَا هُوَ شِفَاءٌ وَرَحْمَةٌ لِلْمُؤْمِنِينَ ۚ وَلَّيَزِيدُ الظَّالِمِينَ إِلَّا خَسَارًا) الآية 82 من سورة الإسراء.
Dedication:

To soul of my father.

To my mother.

&

To my brothers and sisters.
Acknowledgement

My first thanks to God who enabled me to conduct this research.
First and foremost, I would like to express my deepest gratitude to my advisors
Dr. Suzan Gazim Elbari and Dr. ArafAElgorish Musa for their unreserved supports and
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Thanks to the management of Ibrahim Malik Teaching Hospital, particularly to their laboratory
staff for their much help. And thanks to the Ministry of Health Khartoum State .Also I would
like to thanks Mothersand their children for their participation in the study. Especial thanks to my
best friend Dr. Abdiqadir Hassan moalim help and support me.
Risk factors of diarrheal disease among children under five years of age in Ibrahim Malik Teaching Hospital, Khartoum state – Sudan 2017

Sadia Hassan Hussein

Abstract

Diarrheal disease represents a major public health problem in many areas in the world. Diarrheal is leading to cause childhood morbidity and mortality globally in children less than five years of age. This is a cross-sectional descriptive study done in 2017; to study the risk factors of diarrheal disease among children under five years of age in Ibrahim Malik Teaching Hospital Khartoum state (2017). A representative sample of one hundred sixty two (162) mothers with under five children were selected using systematic random sampling. Data were collected by questionnaire, focus groups discussions and anthropometric measures were used to assess the nutritional status of infants. Data analysis was done using Statistical package for social sciences “SPSS” programme. The result showed that the prevalence of diarrhea in children aged less than five years was found to be (87%) in children less than two years of age. (63%) of the children were found to be at risk of moderately malnutrition. Majority of mothers (57.4%) were illiterate, mostly of family were low income, (39.5%). The majority of mothers (80.2%) did not know how to prepare ORS. (50.0%) of the mothers did not wash their hands with soap after using the toilet. The majority of mothers (80.2%) were used untreated water. Among 162 stool samples collected and investigated in laboratory, 23.5% detected were positive to giardia lambia, Shigella was detected in 15.5%. E coli was detected in 10.5%. Rotavirus was detected in 12.4 %, and Entamoebahistolytica cysts were also detected in 4.3% respectively. This study recommended: To increase the awareness of mothers to words the improvement of environmental sanitation and home management of diarrhea. To educate mothers to increase number of breast feeds because of it is benefits for both the mothers and child.
عوامل الخطر التي تؤثر على مرض الإسهال بين الأطفال دون سن الخامسة في مستشفى إبراهيم مالك التعليمي - ولاية الخرطوم 2017

سعدية حسن حسين

ملخص الدراسة

يعتبر مرض الإسهال مشكلة صحية عامة كبيرة في العديد من المناطق في العالم.

ينوي الإسهال إلى الإصابة بالمرض والوفيات للأطفال دون سن الخامسة من العمر عالميا.

هذة دراسة وصفية مستعارة أجريت في عام 2017، تهدف دراسة عوامل خطر لمرض الإسهال لدى الأطفال الذين تقل اعمارهم عن خمس سنوات في مستشفى إبراهيم مالك التعليمي بالخرطوم (2017). تم اختيار عينة ممثلة من مائة وأثنان وستون (162) من أمات الأطفال عشائريات. تم جمع البيانات عن طريق الاستبيانات، ومناقشة المجموعات والمقاييس البشري لقياس الحالة التغذوية للرضع. وقد تم تحليل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية "SPSS". "سبس".

اظهرت النتائج أن معدل انتشار الإسهال لدى الأطفال الذين تقل اعمارهم عن خمس سنوات كان (72%) مع الأطفال الأقل من عامين من العمر الذين عانوا من المرض. (63%) منهم يعانون من سوء التغذية المعتدل، وكانت نسبة الأمهات (68%), من الأمهات، ومعظمهم من الأسر ذات الدخل المنخفض بنسبة (62%), غالبيه الأمهات لا يعرفن كيفية تحضير أملاح الأمهات الفموية بنسبة (41%), (3% من الأمهات لا يفضلن أيديين بالصابون بعد استخدام المرحاض، غالبيه الأمهات (80%) يستخدم نمائي غير متعددة. ومن بين 162 عينة برز تم جمعها وتحليلها معايا وضحت أن (23.5%) عبارة عن الفارسي، و (15%) شيغلي، و (10%) Entamoebahistolytica, و (12.4%) فيروس ثور، و (4.3%) بالخراجات. coli. أوصت هذه الدراسة: بزيادة وعي للأميات بتحسين الاصحاح البيئي في المنزل للإسهال، وتثقيف الأمهات لزيادة عدد الرضاعة الطبيعية لأنها فوائد لكل من الأم والطفل.
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CHAPTER ONE

Introduction

1.1. Background

Diarrheal diseases are one of the main problems affecting children in the world. Reducing their well-being and creating considerable demand for health services. (WHO, 2010).

Diarrhea remains a major public health problem. In developing countries, diarrhea is leading to cause of childhood morbidity and mortality. An estimated one billion episodes and 2.5 million deaths occur each year among children under five years of age. About 80% of deaths due to diarrhea occur in the first two years of life. (Urio, 2001) and (Kosekm, et al 2000).

Diarrhea is the condition of having at least three loose or liquid bowel movements each day. It often lasts for a few days and can result in dehydration due to fluid loss. Signs of dehydration often begin with loss of the normal stretching’s of the skin and irritable behavior. This can progress to decreased urination, loss of skin color, a fast heart rate, and a decrease in responsiveness as it becomes more severe. Loose but non-watery stools in babies who are breastfed, however, may be normal. The most common cause is an infection of the intestines due to either a virus, bacteria, or parasite; a condition known as gastroenteritis. These infections are often acquired from food or water that has been contaminated by stool, or directly from another person who is infected. (WHO, 2013-2014).

Diarrhea is the most important public health problem connected to water and sanitation and can be both “waterborne” and “water-washed. In recent decades, a consensus developed that the key factors for the prevention of diarrhea are sanitation, personal hygiene, availability of water and good quality drinking water, and that the quantity of water that people have available for hygiene is of equal or greater importance for the prevention of diarrhea as the bacteriological water quality (Jensen, et al, 2004).

Control of diarrheal disease (CDD), including promotion of breast-feeding, oral rehydration therapy and specific health education is a part of national strategies aiming to improve the quality of life and reduce the burdens caused by diseases. (Jensen, et al, 2004).

Childhood morbidity and mortality are results of interactions among many factors in developing countries, the interactions of behavioral, socio-economic and environmental factors influence child morbidity. (UNICEF, 2009) (A).
1.2. Problem statement

Worldwide diarrheal disease is the second leading cause of death in under-five year, children only to pneumonia which accounts for one in nine child deaths. It is responsible for 1.7 billion morbidity and 760,000 mortality of children every year and kills 2,195 children every day more than malaria, measles, and AIDS combined. (Who, 2013.)

Diarrhea occurs worldwide and causes 4% of all deaths and 5% of health loss to disability. It kills around 2.2 million people globally each year, mostly children in developing countries (WHO, 2000) and (kosek, et. al, 2003).

Infectious diarrhea resulted in about 0.7 million deaths in children underfive years of age in 2011 and 250 million lost school days. (Jump, et al, 2013).

In the Americas, diarrheal disease accounts for a total of 10% of deaths among children aged 1–59 months. It is estimated that around 21% of child mortalities in developing countries are due to diarrheal disease. (Black, et al, 2012).

A systematic literature review done in developing countries showed that diarrheal disease was responsible for 19% of total under-five deaths, and Africa and south East Asia region account for 78% of all diarrheal deaths occurring among under-five children in the developing world. (WHO, 2008). A study showed that 23% of all deaths among under-five children in south Asia and 22% in Sub Saharan Africa were caused by diarrheal diseases. (Morris, et. al,2008).

In Africa diarrhea is responsible for 25-75% of all childhood diseases and accounts for about 14% of outpatient visits and 16% of hospital admissions. (Child health Research project.1998). The majority of morbidity and mortality related to under-five children diarrheal were in Africa and South Asia. (WHO, 2013).

Sudan has one of highest prevalence rates of diarrhea and global acute malnutrition. (Karrar and Omer, 1981). The incidence of diarrhea in Elmasudiya village was 217 episodes per 1000 children per year, and was one of the three commonest causes of morbidity. In a 2000 Multiple Indicator Cluster Survey report, 28% of children below the age of 5 years in north Sudan had diarrhea in the two weeks prior to the survey, varying from 40% in Blue Nile to 19% in South Kordofan. (UNICEF, 2000).

Risk factors for diarrhea among children include geographic location, drinking from unprotected water supply. (Molbak, et al,1997). And household economic status. While poor sanitation, limited access to potable water, inappropriate breastfeeding practices contribute to the
burden of disease, there continues to be the need to further document the socio-demographic correlates of diarrhea in order to inform policy and programmatic interventions that have potential to stem the prevalence of the condition. (Kandala, et al, 2013).

In Khartoum state in the year 2006, the number of sick children under five years of age, who had visited the health units, was 739591. Fifty four thousand and forty three (54043) out of these were attacked by diarrhea, with a percentage of 7.3%. (FMH, 2006).

In Sudan, the national control of diarrheal disease program has been established in 1985 with the objective of decreasing diarrhea mortality among children less than five year. It is also aimed to increase the use of ORS and to raise the mothers’ awareness about home management of diarrhea. (Abdalla, 1999).
1.3. Justification

Diarrhea is major problem in developing countries and leading to cause of illness and death in young children. And also causes mortality and morbidity in children in Sudan, and it is the second most common cause of death in young children, after pneumonia.

Diarrheal disease kills more than 1.5 million children less than five years of age every year in the world.

The problems of diarrheal disease, poverty, malnutrition, sanitation, illiteracy and high fertility are traditionally associated with underdevelopment.

My study aimed to identify the most common pathogens and risk factors for diarrheal illness among children aged less than five years, in Ibrahim Malik teaching hospital.
1.4: objectives

1.4.1: General object

To determine the risk factors of diarrheal disease among children under five years of age in Ibrahim Malik Teaching Hospital (2017).

1.4.2: specific objectives

1: To find risk factors of diarrheal disease.
2: To determine types of diarrheal disease.
3: To assess knowledge, attitude and practices of mothers about children’s with diarrheal disease
4: To assess socio-economic status.
5: to assess the personal hygiene.
CHAPTER TWO

Literature review

2.1: Definition

Diarrhea is the condition of having at least three loose or liquid bowel movements each day. (WHO, 2013)

Diarrhea is an increase in the fluid, volume and frequently of stools relative to the usual habits of each individual. (Gamal, 2013).

Diarrhea is the passage of loose or watery stools occurring three or more times in a 24-hour period. (Abram’s, 1995).

2.2: causes of diarrhea

1: Infectious causes

A: Enteric infections

i. Viruses: Rota virus related to (15-25%) of cases, Norwalk agent enteric adenoviruses (12%).

ii. Bacteria: ETEC related to (10–20%), shigella related to (5-15% of cases) and campylobacterjejuni (10-15%). Salmonella (18-25%), EIEC, EHEC, Yersinia,enterocolitis and Vibrio cholera.

iii. Protozoa: cryptosporidium (5-15 cases), other less common pathogens, Giardia and E-histolytic.( Gamal, 2013).

B: Parenteral infection

Like pneumonia and otitis media may be accompanied by diarrhea, the mechanism of which is still unknown but may be due to food intolerance during infection.

Non infectious causes

A. Dietetic factors: overfeeding, food allergy and giving non suitable diet as too concentrated formula or a food which is not suitable for age.

B. Malabsorption: disaccharides deficiency, cilia disease and cystic fibrosis.

C. Endocrinal disorders: thyrotoxicosis, Addison’s disease, adrenogenital syndrome.

D. Miscellaneous: protein-losingentropathyirritablecolon,ulcerative, colitis, immunodeficiency, neuroblastoma, malrotation and antibiotic associated diarrhea.(Gamal, 2013)
C:Reservoirofinfection

For some enteric pathogens, man is the principal reservoir and thus most transmission originates from human factors; examples are *enterotoxigenic E. coli, Shigella, streptococcus, spp, V.cholerae, Giardia labia and E.histolytica.* For other enteric pathogens, animal are important reservoirs and transmission originates from both human and animal feces. Examples are *campylobacter jejune, salmonella spp and Y.enterocolitica.* For viral agents of diarrhea, the role of animal reservoirs in human disease remains uncertain. (WHO, 1992),(B).

2.3: Types of diarrhea

The disease of diarrhea has four types

2.3.1: Acute watery diarrhea: this term refers to diarrhea characterized by abrupt onset of frequent, watery, loose stools without visible blood, lasting less than two weeks . Usually acute watery diarrheal episodes subside within 72 hours of onset. It may be accompanied by flatulence, malaise and abdominal pain. Nausea, vomiting may occur and also fever may be present. The common causes of acute watery diarrhea are viral, bacterial, and parasitic infections. Bacteria also can cause acute food poisoning. The enteric pathogens causing this diarrhea in developing countries are largely, the same that are encountered in developed countries, but their proportions are different. In general, bacterial pathogens are more important in countries with poor hygienic conditions. The most important causes of this diarrhea in developing countries are *rotavirus, Shigellae, enterotoxigenic E. coli (ETEC), Vibrio, cholerae, Campylobacter, jejuni, enteropathogenic E. coli (EPEC), Salmonella spp.* And *Cryptosporidium.* (Vesikari, et al, 1994)

The most dangerous complication is dehydration that occurs when there is excessive loss of fluids and minerals (electrolytes) from the body. With vomiting, dehydration becomes more severe. Dehydration is especially dangerous in infants and young children due to rapid body water turnover, high body water content and relatively larger body surface. Patients with mild dehydration may experience only thirst and dry mouth. Moderate to severe dehydration may cause orthostatic. Hypotension with syncope (fainting upon standing due to a reduced volume of blood, which causes a drop in blood pressure upon standing), a diminished urine output, severe weakness, shock, kidney failure, confusion, acidosis (too much acid in the blood), and coma. (Molbak, 2000.)
2.3.2: **Dysentery** the main dangers are damage of the intestinal mucosa, sepsis and malnutrition; others complication including dehydration, may also occur. It is marked by visible blood in the stool. The most common causes of bloody diarrhea is *Shigella*, a bacteria that is also a most common cause of severe cases. (WHO, 2005). (A)

2.3.3: **Persistent diarrhea** which lasts 14 days or longer. The main dangers is malnutrition and serious non-intestinal infection, dehydration may also occur. Persons with other illness, such as AIDS, are more likely to develop persistent diarrhea. (WHO, 2005). (A)

2.3.4: **diarrhea with severe malnutrition (marasmus and kwashiorkor)**

The main dangers are sever systemic infection dehydration, heart failure and vitamin and mineral deficiency. (WHO, 2005). (A)

2.4: **Transmission of diarrheal pathogens**

Most of the pathogenic organisms that causes diarrhea and all pathogens that are known to be major causes of diarrhea in many countries are transmitted primarily or exclusively by the faecal – oral route. Faecal oral route transmission may be water borne, food borne or direct transmission which implies an array of other fecal – oral routes such as via fingers or fomites or dirt which may ingested by young children. There are four transmission routes that the major infectious agents use to reach human hosts, namely human-to-human via the environment; human-to-human multiplying in the environment; human-to animal-to human via the environment; and animal-to-human via the environment. In situations where fecal contamination of the domestic environment is high, the majority of cases of endemic disease probably occur either by human-to-human transmission, or from the human-to-human transmission of pathogenic agents which have multiplied in the environment. (Feachem, 1994).

2.5: **risk factors for diarrhea**

2.5.1: **Demographic factors**

These factors include age and gender of children’s, low level education of mothers, high number of siblings, birth order were significantly associated with more diarrhea occurrence in children less than five. (Sobel, et al, 2004).
2.5.2: Socio-economic factors

Socio-economic factors, such as poor housing, crowded conditions, low income and marital status. (Yassin, 2000).

2.5.3: Water-related factors

As diarrhea is acquired via contaminated water and foods, water related factors are very important determinants of diarrhea occurrence. Increasing distance from water sources, poor storage of drinking water, use of unsafe water sources and low per capital water used have been found to be risk factors for more diarrhea occurrence among children less than five. (Woldemicael, 2001).

2.5.4: Sanitation factors

Sanitation obviously plays a key role in reducing diarrhea morbidity. Some sanitation factors, like indiscriminate or improper disposal of children's stool and household garbage, no existence of latrine or unhygienic toilet, sharing latrine and house without sewage system, increased the risk for diarrhea in children. (Yassin, 2000).

2.6.5: Hygiene practices

Children not washing hand before meals or after defecation. Mothers not washing hands before feeding children or preparing foods, children eating with their hands rather than with spoons, eating of cold leftovers, dirty feeding bottles and utensils. Unhygienic domestic places (kitchen, living room, and yard) unsafe food storage presence of animals inside the house and presence of flies inside the house were associated with risk of diarrhea morbidity in children. (Molbak, et al. 1997).

2.6.6: Breastfeeding

In general, the morbidity of diarrhea is lowest in exclusively breast-fed children, it is higher in partially breast-fed children, and highest in fully-weaned-children. (Woldemicael, 2001).

In addition, a particular risk of diarrhea is associated with bottle feeding. A high concentration of specific antibodies, cells, and other mediators in breast milk reduce the risk of diarrhea following colonization with enteric pathogens. (Etiler, et al. 2004).
2.6.7: Malnutrition

The association between diarrhea and malnutrition is so common in low income societies that the concept of a vicious circle is appealing, with diarrhea leading to malnutrition and malnutrition predisposing to diarrhea. Children whose immune systems have been weakened by malnutrition are the most vulnerable to diarrhea. (Etiler, et al, 2004). Diarrhea, especially persistent and chronic diarrhea, undermines nutritional status, resulting in malabsorption of nutrients or the inability to use nutrients properly to maintain health. (Wijewardene, et al, 1992).

2.5.8: Seasonal distribution

Seasonal patterns to childhood diarrhea have been noted in many tropical locations where there are two definite seasonal peaks: the summer one associated with bacterial infections, and the winter one, related to viruses. In some studies diarrhea prevalence was found to be higher in the rainy season than in the dry season. During the dry seasons when rainwater and borehole water are less available, disinfecting drinking water from available surface sources may substantially reduce illness. In some studies contamination was more prominent during the rainy season. (Ghosh, et al. 1997).

2.5.9: Eating habits

Eating with the hands; eating raw foods; or drinking unboiled water may increase risk of diarrhea. (Rice, et al. 2000).

2.5.10: Host factors

Diarrhea is most common in children especially those between 6 months and 2 years. Incidence is highest in the age group 6-11 months when weaning occur. It reflects the combined effects of declining levels of maternally acquired antibodies the lack of active immunity in the infant the introduction of contaminated food and direct contact with human and animal faeces when the infant starts to crawl. It is also common in babies under 6 month of age fed on cow’s milk or infant feeding formulas. Diarrhea is more common in persons with malnutrition. Malnutrition leads to infection and infection to diarrhea which is a well-known vicious circle. Poverty, prematurity, reduced gastric acidity, immunodeficiency, lack of personal and domestic hygiene and incorrect feeding practices are all contributory factors. (WHO, 1981).
2.5.11: Environmental factor

Distinct seasonal patterns of diarrhea occur in many geographical areas. In temperate climates, bacterial diarrhea occurs more frequently during the warm season, whereas viral diarrhea, particularly diarrhea caused by rotavirus peak during the winter. In tropical areas, rotavirus diarrhea occurs throughout the year, increasing in frequency during the drier, cool months, whereas bacterial diarrheas peak during the warmer, rainy season. The incidence of persistent diarrhea follows the same seasonal patterns as that of acute watery diarrhea. (WHO, 1992). (B).

2.6: Pathogenesis of diarrhea

Normally the water and electrolytes are secreted in to the intestinal lumen in the crypt and absorbed in the villi. More than 90% of fluids and electrolytes in the crypts are reabsorbed by the villi. Diarrhea is essentially caused by a break down in this balance i.e. Increasing secretion / or decreased absorption of water and electrolytes. (Gamal, 2013)

2.6.1: Pathogenesis of viral diarrhea

Viruses like rotavirus invade the absorptive electrolytes of the villi in the upper small intestine while the crypt cells are spared. The virus replicates causing patchy epithelial cell destruction and villous shortening. Destroyed absorptive cells are rapidly replaced by cells that migrate up from the crypt so that a few hours after infection the effected villi become temporarily covered by immature secretory crypt like cells that cause the intestine to secrete water and electrolytes. Villous damage may also be associated with loss of disaccharides, especially lactose. Recovery occurs when the villi regenerate and the villous epithelium matures (usually within 3-5days). (Gamal, 2013).

2.6.2: Pathogenesis of bacterial diarrhea

2.6.2.1: Secretion of enterotoxigenic E. coli produce toxins that stimulate the production of AMP in the mucosal cells leading to inhibition of absorption from villi and increased secretion of water and electrolytes in crypts. (Gamal, 2013).

2.6.2.2: Mucosal invasion other organisms like shigella, campylobacter jejuni, enteroinvasive E. coli and salmonella can cause bloody diarrhea by invading and destroying mucosal epithelial cells. (Gamal, 2013).
2.6.2.3: Mucosal adhesion: bacteria that multiply within the small intestine must first adhere to the mucosa to avoid being swept away. This property appears to be an important determinant in their pathogenicity. (Gamal, 2013).

2.6.3: Pathogenesis of protozoa diarrhea

2.6.3.1: Mucosal adhesion: *G. lamblia* and *Cryptosporidium* adhere to the small bowel epithelium and cause shortening of villi and diarrhea. (Gamal, 2013).

2.6.3.2: Mucosal invasion: virulent *E. histolytica* causes diarrhea by invading epithelial cells of the colon (or ileum) and causing micro abscess and ulcers. (Gamal, 2013).

2.7: Dehydration

Dehydration is a state in which the body lacks its normal complement of water and electrolytes. (Sodium, chloride, potassium and bicarbonate) Severe dehydration can lead to multi-system failure and death, and is therefore considered a life-threatening condition that demands urgent hospital treatment. The degree of dehydration is rated on a scale of three:

2.7.1: Early dehydration – no signs or symptoms.

2.7.2: Moderate dehydration

- Thirst
- Dryness of the mouth
- Headache
- Darker urine than normal
- Feeling of giddiness on standing up
- Sleepiness or tiredness
- In babies, a failure to wet the diaper or pass the urine for three hours or more.

2.7.3: Severe dehydration

- A racing heart beat
- A low blood pressure
- Fever or a rise in body temperature
- Irritability or confusion
- Low urine output
- In babies, sunken fontanel’s that reveal the presence of dehydration
Death can follow severe dehydration if body fluids and electrolytes are not replenished, either through the use of oral rehydration salts (ORS) solution, or through an intravenous drip (WHO, 2009).

2.8: Clinical assessment of a patient with diarrhea

A number of clinical signs are used to determine the level of the dehydration, and these are the following signs:

1: Child’s general condition – The child may be lethargic or unconscious, or restless and irritable
2: Child’s reaction when offered a drink – The child might not be able to drink or may be drinking poorly. The child may also be drinking eagerly or may be thirsty.
3: Elasticity of skin – This sign is checked by using the skin pinch test.
4: Sunken eyes.

According to the IMCI approach, all children with diarrhea should be assessed for:

1: How long the child has had diarrhea?
2: signs of dehydration
3: Blood in the stool to determine if the child has dysentery. (WHO, 2005).

2.9: Signs symptoms of diarrhea disease

The clinical presentation and course of diarrhea therefore depend on its cause and on the host. Considered the following to determine the sources and causes of the patient’s diarrhea.

1: stool characteristics (e.g. Consistency, color, volume, frequency).
2: presence of associated enteric symptom’s (e.g. nausea, vomiting, fever, and abdominal pain).
3: use of child day care (common pathogen: rotavirus, astrovirus, calicivirus, campylobacter, shigella, giardia and cryptosporidium species (SPP)).
4: food ingestion history (e.g. raw contamination food, food poisoning).
5: water exposure (e.g. swimming pools, marine environment).
6: Travel history (common pathogens affect specific regions, also consider rotavirus, shigella, salmonella, and campylobacter, spp regardless of specific travel history, as these organisms are prevalent worldwide).
7: Animal exposure (e.g. young dogs, cats: campylobacter, spp, turtles, salmonella spp).
8: predisposing conditions (e.g., hospitalization, antibiotic use, immunocomprised state) (Beubler, et.al, 1990).
2.10: Complications of diarrheal disease

2.10.1: Complication of acute watery diarrhea
- Dehydration: Patients with watery diarrhea produce stools containing large amounts of water, sodium, chloride, and potassium and bicarbonate ion. And there are three types of dehydration:
  - Isotonic dehydration, Hypertonic dehydration and Hypotonic dehydration.
  - Metabolic acidosis- Post-acidotic tetany.
  - Hypokalemia.- CNS complications
  - Cardiovascular complications. - Gastrointestinal complications
  - Renal complication. - Nutritional complications.
  - Hematological complications.(Gamal, 2013)

2.10.2: Complications of dysentery (Bloody Diarrhea)
This occurs especially with shigella and leads to:
Intestinal perforation, toxic mega colon, rectal prolapsed, convulsion, septicemia, malnutrition, protein-losing and entropathy. (Gamal, 2013)

2.11: Diagnosis of diarrhea
In addition to a complete medical history, physical examination, medical history, and laboratory tests for blood and urine, the physician may request:
1: Stool: stool analysis and culture: to check for bacteria, parasites, or signs of disease
2: Additional blood Tests: A complete blood count test may help determine what’s causing diarrhea.
3: Fasting tests: identify food intolerance or allergies.
4: Sigmoidoscopy helpful in identifying the causes of diarrhea, abdominal pain, constipation, abnormal growths, and bleeding.
5: Urine analysis to exclude urinary tract infection.
6: serum electrolytes Na, Ka. And PH, serum bicarbonate (for acid –base balance)
7: sever complicated cases: Renal function tests, Investigation to exclude DIC(fibrin degradation products). (Gamal, 2013).

2.12: Treatment

2.12.1: Viral diarrhea
No antibiotic treatment required. Give oral rehydration therapy alone as above.
2.12.2: Shigella dysentery
Trimethoprim
5 mg/kg/dose + sulfpamethoxazole 25 mg/kg twice daily for 3 days
Ceftriaxone 40 mg/kg/day I.Vor I.M.divided every 12 hours for 5 days.

2.12.3: Amoebic diarrhea
Metronidazole, 30-50 mg/kg/day for 10 days

2.12.4: Giardiasis
Metronidazole, 15 mg/kg/day for 5 -7 days

2.12.5: Cholera
Tetracycline 50 mg/kg/day in 6 hours divided dose for 3 days
Trimethoprim 5 mg/kg/day +sulfpamethoxazole 25 mg/kg twice daily for 3 days

2.12.6: Antidiarrheal drugs: none has any proven scientific value in the reduction of watery stools. Opiates and ant motility agents are dangerous. Others drugs are only water adsorbents that make stools less fluidly without causing any significant reduction in their amount.

2.12.7: Antiemetic’s: vomiting in dehydrated patient usually stops after rehydration and correction of acidosis. Antiemetic’s are either of no value or have serious side effects and they should not be used. (Gamal 2013).

2.13: Control of diarrheal diseases
It is now obvious that many different organisms – some known, probably many unknown cause diarrhea. It is also clear that they do not act in the same way to cause diarrhea. But from an epidemiological point of view, they are considered together because of the common symptom, diarrhea. It is now firmly established that regardless of the causative agent or the age of patient, the sheet anchor of treatment is oral dehydration therapy such as the one advocated by WHO/UNICEF.

The diarrheal diseases control (DDC) Program of WHO has since its inception in 1980, advocated several intervention measures to be implemented simultaneously with mutually reinforcing and complementary impacts. These measures center round the widespread practice of “oral rehydration therapy”.(pizzarro ,1985).

2.14: Components of a diarrheal diseases control program
The intervention measures recommended by WHO may be classified as below:
2.14.1: Short term
1. Appropriate clinical management

2.14.2: Long-term
2. Better MCH care practices.
3. Preventive strategies.
4. Preventing diarrheal epidemics.(Park, 2013)

2.14.3: Short term programs
2.14.3.1: Appropriates clinical management
2.14.3.1.1: Oral rehydration therapy

Oral rehydration treatment can be safely and successfully used in treating acute diarrhea due to all etiologies, in all age groups and in all countries. The aim of oral fluid therapy is to prevent dehydration and reduce mortality. Oral fluid therapy is based on observation that glucose given orally enhances the intestinal absorption of salt and water, and is capable of correcting the electrolyte and water deficit. (Park, 2013)

At first the composition of oral rehydration salt(ORS) recommended by who sodium bicarbonate based Inclusion trisodium citrate in place of sodium bicarbonate made the product more stable and it resulted in less stool output especially in high output diarrhea as in cholera probably because of direct effect of trisodium citrate in increasing intestinal absorption of sodium and water. More recently an improved ORS formulation has been developed which is as safe and effective as the original in preventing and treating diarrheal dehydration but also reduced stool output or offers additional clinical benefit or both. It is focused on reducing the osmolality of ORS solution to avoid possible adverse effect of hyper tonicity on net fluid absorption by reducing the concentration of glucose and sodium chloride in the solution. Decreasing the sodium concentration of ORS solution to 75 mOsm/l improved the efficacy of the ORS regimen for children with acute non cholera diarrhea. The need for unscheduled supplemental intravenous therapy in children given the new ORS fell by 33 per cent, the stool out put decreased by 20 per cent and vomiting was reduced by 30 per cent. The reduced osmolality (245 mOsm/l) solution also appears to be safe and effective as standard ORS for use in children with cholera.

Recommended formulation: Because of the improved effectiveness of reduced osmolality ORS solution, WHO and UNICEF are recommending that countries manufacture and use the
following formulation in place of the previously recommended ORS solution. Since January 2004, the new ORS formulation is the only one procured by UNICEF. India was the first country in the world to launch this ORS formulation. (Park, 2013)

**Composition of reduced osmolality ORS**

2.14.3.1.1.1: Reduced osmolality ORSgram’s/liter

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium chloride</td>
<td>2.6</td>
</tr>
<tr>
<td>Glucose anhydrous</td>
<td>13.5</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>1.5</td>
</tr>
<tr>
<td>Trisodium citrate dehydrate</td>
<td>2.9</td>
</tr>
<tr>
<td>Total weight</td>
<td>20.</td>
</tr>
</tbody>
</table>

2.14.3.1.1.2: Reduced osmolality ORSmmoll/liter

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>75</td>
</tr>
<tr>
<td>Chloride</td>
<td>65</td>
</tr>
<tr>
<td>Glucose anhydrous</td>
<td>75</td>
</tr>
<tr>
<td>Potassium</td>
<td>20</td>
</tr>
<tr>
<td>Citrate</td>
<td>10</td>
</tr>
<tr>
<td>Total osmolality</td>
<td>245</td>
</tr>
</tbody>
</table>

2.14.3.1.2: Intravenous rehydration

Intravenous infusion is usually required only for the initial rehydration of severely rehydrated patients who are in shock or unable to drink. Such patients are best transferred to the nearest hospital or treatment center. (Park, 2013).

2.14.3.1.3: Zinc supplementation

When zinc supplement is given an episode of acute diarrhea it reduces the episode duration and severity. In addition zinc supplements given for 10 to 14 days lower the incidence of diarrhea in the following 2 to 3 month. WHO and Unicef therefore recommended daily 10mg of zinc for infants under 6 months of age and 20 mg for children older than 6 months for 10-14 days. (WHO, and UNICEF. 2004)
2.14.4: Long term program

2.14.4.1: Better MCH care practices

2.14.4.1.1: Maternal nutrition: improving prenatal nutrition will reduce the low birth weight problem. Prenatal and post-natal nutrition will improve the quality of breast milk. (UNICEF, 2012).

2.14.4.1: Child nutrition

A: Promotion of breast-feeding: Breastfeeding promotion is one of the most cost-effective health interventions for preventing cases of diarrhea and preventing deaths from diarrhea. During the first six months of life, the risk of having severe diarrhea that requires hospital referral can be 30 times greater for infants who are not breastfed than for those who are exclusively breastfed.

B: Appropriate weaning practices: Poor weaning practices are a major risk factor for diarrhea. The child should be weaned neither too soon, nor too late, in any case not earlier than the sixth month of life using nutritious and locally available foods, and the foods should be hygienically prepared and given.

C: Supplementary feeding: This is necessary to improve the nutritional status of children aged 6-59 months. As soon as the supplementary food is introduced, the child enters the high-risk category

D: Vitamin A supplementation: is critical preventive measure and studies have shown mortality reductions ranging from 19 per cent 54 per cent in children receiving supplements. This reduction is associated in large part with decline in deaths due to diarrheal diseases and measles. It also reduces the duration, severity and complications associated with diarrhea. (UNICEF, 2012).

2.15: The importance of Breast Feeding

Breast feeding contains the nutrients antioxidants hormones and antibodies needed by child to survive and develop. Infant who are exclusively by breast fed for the first six months of life and continue to be breast fed until two years of age and beyond and develop fewer infections and have less severe illnesses than those who are not even among children whose mothers are HIV-positive. (American Academy of Pediatrics, 2017).
2.15.1: Benefits of breast feeding to the Child

Breast milk provides the ideal nutrition for infant. It has a nearly perfect mix of vitamins, protein, fat and everything the baby needs to grow and it's all provided in a form more easily digested than infant formula. Breast milk contains antibodies that help your baby fight off viruses and bacteria. Breastfeeding lowers your baby's risk of having asthma or allergies. Babies who are breastfed exclusively for the first 6 months, without any formula, have fewer ear infections, respiratory illnesses, and bouts of diarrhea. Breastfed infants are more likely to gain the right amount of weight as they grow rather than become overweight children.

Breastfeeding also plays a role in the prevention of SIDS (Feachem, 1994)

2.15.2: Benefits of breast feeding to the mother

- Breastfeeding burns extra calories, so it can help you lose pregnancy weight faster.
- It releases the hormone oxytocin, which helps your uterus return to its pre-pregnancy size and may reduce uterine bleeding after birth.
- Breastfeeding also lowers your risk of breast and ovarian cancer.
- It may lower your risk of osteoporosis.

2.15.3: Social and Economic Benefits of Breastfeeding

- The benefits of breastfeeding go beyond health considerations. Mothers who nurse their children enjoy social and economic advantages as well. For example:
- Women who breastfeed avoid the financial burden of buying infant formula, an average expense of $800 per year. Breast-fed babies are less likely to need excessive medical attention as they grow. (Feachem, 1994)

2.16: Preventive strategies

Proper treatment of diarrhea is very effective in reducing dehydration, malnutrition and preventing death. However, the incidence of diarrhea can be reduced only by preventive interventions.

The most effective preventive measures to reduce the incidence of diarrhea are:

A: Promotion of exclusive breastfeeding.
B: Proper complementary feeding practices.
C: Immunization (rotavirus, penta, measles).
D: Improved water and sanitary facilities.
E: Promotion of personal and domestic hygiene. (Chien Hung Chang, 2005)
2.16.1: Use of Safe Drinking Water

The risk of diarrhea can be reduced by using the cleanest available water and protecting it from contamination. The World Health Organization (WHO) established water quality guidelines for drinking water (1996/1998) that included no detectable levels of E. coli or coli form bacteria and arsenic levels at or less than 10 mg/l.

Sources of clean water should be protected from contamination by:

- Not allowing bathing, washing, or defecation near the source.
- Keeping animals away from the source of water.
- Collecting and storing in clean containers.
- Using boiled water for preparing food for young children. (Park, 2013)

2.16.2: Hand Washing and Safe Disposal of wastes

Regular hand washing is one of the most effective measures for preventing diarrhea. All family members should wash their hands thoroughly with soap after defecation, after cleaning a child who has defecated, after disposing of a child's stool, before preparing food, and before eating. Diarrheal pathogens are excreted in the stools of an infected person or animal. So, it is very important to dispose of feces properly to interrupt the spread of infection. Ideally, every family should have access to a clean, functioning latrine. If it is not available, the family should defecate in a designated place and bury the feces immediately. (Park, 2013)

2.16.3: Health education

Environment sanitation measures require educational support, to ensure their proper use and maintenance of such facilities. An important part of health workers' job is to help prevent diarrhea by convincing and helping community members to adopt and maintain certain preventive practices such as breastfeeding, improved weaning, cleaning water, use plenty of water for hygiene, use of latrine and proper disposal of stools of young children.

2.16.4: Fly control

Flies breeding in association with human or animal faeces should be controlled. (Park 2013).

2.16.5: Immunization

Immunizations help reduce deaths from diarrhea in two ways: by helping prevent infections that cause diarrhea directly, such as rotavirus, and by preventing infections that can lead to diarrhea as complication of an illness such as measles. (WHO, 2009). (B).
2.16.6: Rotavirus

Is estimated to cause about 40 per cent of all hospital admissions due to diarrhea among children under five years of age worldwide leading to some 100 million episodes of acute diarrhea each year that result in 350,000 to 600,000 child deaths. Introduction of rotavirus vaccine in countries with the greatest diarrhea burdens, especially in Asia and Africa, must be accelerated on a priority basis. Global rotavirus vaccine introduction has recently been recommended by the World Health Organization (WHO, 2009). (B)

2.16.7: Measles

Is an acute viral infection that is often self-limiting. But some children, particularly those who are undernourished or have compromised immune systems, may experience serious side effects including diarrhea. Diarrhea is one of the most common causes of death associated with measles worldwide. (Hoekstra, et. al 2006)

2.16.8: Control and/or prevention of diarrheal in epidemics

This requires strengthening of epidemiological surveillance systems.

2.16.9: Primary health care

The concept of primary health care involves the delivery of a package of curative and preventive services at the community level. An intersectional approach centered upon primary health care involving activities in the fields of water supply and excreta disposal, communicable disease control, mother and child health, nutrition and health education is regarded as essential for the ultimate control of diarrheal diseases. (Park, 2013).
CHAPTER THREE
Material and methods

3.1- Study design
It is a descriptive cross-sectional study to determine the risk factors of diarrheal disease among children under five years of age.

3.2- Study area
The study area was Ibrahim Malik teaching hospital that provides health services mainly for community in Khartoum state and people coming from different states for special care, which located in Al-sahafashirk square 41 and it is bounded to the siniya center from the south and square 37 from north. Ibrahim Malik teaching hospital was established in 1977, the first administrator was abdimunimqadaranimer. In 1981 the first unit of pediatric was established, followed by unit of surgery in 1984 and gyneo-obs, and in 1985 become complete hospital, in 2014 brain center was established and in 2016 orthopedic was established. The total number of doctor’s are 118 and total number of nurses are 195 and contain 412 of beds. (Office of Management and office of statistics 2017).

3.3- Study population
Study population all the children below the age of five years with diarrheal disease in Ibrahim Malik Teaching Hospital.

3.4: Inclusion criteria and exclusion criteria

3.4.1: Inclusion criteria
1: children between 6 months to below the age of five years.
2: mothers whose child was having diarrhea at the time of study.
3: all types of diarrhea.

3.4.2: Exclusion criteria
1: children above 5 years of age.
2: children with blood diarrhea,
3: children with cholera.
3.5: Research Variable

3.5.1: Dependent variable

The study has one dependent variable which is diarrhea. Acute diarrhea is defined as three or more, loose, liquid, or watery stools or at least one bloody loose stool within 24 hours. Persistent diarrhea is defined as diarrhea that begins acutely and lasts at least 14 days.

3.5.2: Independent variable

The independent variables in the study are regarded as the potential risk factors for diarrhea among children less than five years, including demographic, socio-economic factors, knowledge of diarrhea stated by the mothers, sanitation, hygiene, and water-related factors, and the child’s breastfeeding and vaccination statuses.

3.6.1: Sample size

Sample size was calculated using formula

\[
 n = \frac{Z^2pq}{d^2} \quad (\text{fisher} \, 1998)
\]

Where \( n \) = desired sample size.

- \( Z \) = standard normal deviate at 95% confidence level (1.96)
- \( P \) = proportion of population with children under five years 0.12
- \( q \) = 1 - \( P \)
- \( d \) = degree of accuracy desired (0.05)

\[
 n = 1.96^2 \times (0.12 * 0.88) = 162
\]

3.6.2: Sampling technique

Systematical sampling was used to select mothers with children under five years of age in Ibrahim Malik Teaching Hospital 2017.

3.7: Data collection tools

3.7.1: Questionnaire

A structured questionnaire was used to obtain data through face to face interviews. The questionnaire was written in English, translated into Arabic; the main language spoken in the area. The questionnaire had six sections: a section on demographic and social economic characteristics; a section on knowledge of diarrhea by the mothers; a section on sanitation and disposal factors; a section on hygiene related practice; a section on drinking water related practices; and a section breast feeding and the vaccination status of the children.
3.7.2: Laboratory analysis of stool

Stool samples were collected from patients into the study.

1: Parasitological studies: Each fecal sample was examined by direct microscopy in order to detect *Entamoeba histolytica*, *Giardia lamblia* and *Cyclospora cayetanensis*.

2: Bacteriological studies: Enteric pathogens were investigated by culture. Fresh stool samples were inoculated on *Salmonella-Shigella* (S-S) agar and MacConkey agar.

3: Virological studies: Regarding viral pathogens, due to limited resources, we detected only rotavirus, the most common virus causing diarrhea in children. Rotavirus was detected by using an enzyme immune assay (EIA) test kit.

3.7.3: Focus group discussion

Focus group discussion guide was used to lead the discussions. The focus group discussions were conducted by the main investigator. During the focus group discussions, notes were taken.

3.7.4: Anthropometric measurements: Followings were performed.

1: Height - For children who can stand up, height was measured. Child stands upright without shoes against a vertical wall with head, shoulders, buttocks, and heel touching the wall. He looks directly forwards. A rigid board was placed on the head and its point of contact with the wall was marked. The distance between the point and the floor was measured in centimeters by a tape to give the height.

2: Length - This was measured for babies who cannot stand up. The child was placed supine on a flat surface, the head was held firmly in a position touching a vertical, rigid head board. Legs were straightened with feet at right angles to the legs keeping the toes upwards. Another rigid vertical board was brought in contact with the heel. The positions of the two boards were marked and the distance between them was measured by a tape to obtain the length of the child. The measurements were taken in centimeters.

3: Weight - Weight is measured in kilograms by using a spring balance. For this, the subject must be in minimal clothing. Proper functioning of the spring balance was assessed by weighing a known weight and also by noting if the pointer comes back to zero mark upon withdrawal of the weight. If the child could stand, he/she was made to stand on the machine and weight was noted. If the child could not stand, he/she was laid down on the balance and weight was noted.

4: Mid-upper arm circumference - This was measured for children of 0-59 months of age. The left arm is conventionally chosen. It was measured at a point mid-way between the acromian...
process of scapula and the olecranon process of ulna. A non-elastic measuring tape was used for the purpose. Results were interpreted as follows-
MUAC >13.5 cm suggests normal nutritional status.
MUAC between 12.5 and 11.5 cm suggests mild to moderate malnutrition.
MUAC <11.5 cm suggests severe malnutrition

3.8: statistical analysis

The data was analyzed by using the computerized program statistical package for social science (SPSS), and excel word, finding were presented as tables and figures.

3.9: Ethical considerations

1: Approval from university of Gazira, Khartoum state ministry of health research department, and from hospital.
2: Research purpose and objectives will be explained to participant in clear simple words.
3: Participant has right to voluntary informed consent.
4: Participant has right to withdraw at any time without any deprivation.
5: Participant has right to no harm (privacy and confidently by using coded questionnaire.)
CHAPTER FOUR

RESULTS AND DISCUSSION

Diarrhoea is serious disease with high morbidity and mortality especially in children under five years of age. It is the second most common cause of death in young children, after pneumonia. A sample size of 162 mothers with children under five years of age were included in the analysis and discussed as follow:

4.1: Socio-Demographic characteristic

Figure (4.1.1) Age of children under five years of age in Ibrahim Malik Teaching Hospital 2017.

Figure (4.1.1) shows that the majority of the children (46.3%) were aged between 1-2 years. This age group is vulnerable to adverse effects of diarrhea disease. This finding is in agreement with the finding reported by WHO, (2005) (B) which found that, the prevalence rate of diarrhea decreased significantly with increased age.
Figure (4.1.2): Gender distribution among children under five years of age in Ibrahim Malik Teaching Hospital 2017.

Figure (4.1.2) shows that majority of children (51.2%) were male. Gender may be a determinant of diarrhea incidence in some cultures. This is result agree with study finding conducted in Saudi Arabia by Alshehri et al. (2009). Who reported that incidence of diarrhea in males was 6.8% but in females it was almost twice as much 13.3%. This might point to a possible cultural influence in this region by which the nutrition of female children is neglected restricting their access to health.
Figure (4.1.3) Distribution of studied children under five of age according to birth order in Ibrahim Malik Teaching Hospital 2017.

Figure (4.1.3) Shows that (48.1%) of children were fourth in their birth order. This finding agree with Gascon, et al, (2000) who found that birth order was associated with risk of diarrhea. With latestborn having a lower risk of diarrhea.

Figure (4.1.4) Distribution of children under five years of age according to place of residents in Ibrahim Malik Teaching Hospital 2017
Figure (4.1.4) shows that the majority of children (59.2%) were from urban areas. This is an indication that, the majority came from areas with access to improved water and sanitation. High prevalence of diarrheal disease was documented in many rural areas. This could be due to the urban community may have an access to improved water source, sanitation facility, health care facility and better knowledge about the prevention and control of disease. This result is agree with the study done in East Ethiopia by (Mitike 2001) finding the children from families in rural residences were affected by diarrhea disease.

Table (4.1.1) Distribution of wasting children under five in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Wasting(WHZ) of children</th>
<th>Male. f (%) N=83</th>
<th>Female’s (%) N=79</th>
<th>All sex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3SD</td>
<td>21(25.3)</td>
<td>23(29.1)</td>
<td>44(27.2%)</td>
</tr>
<tr>
<td>2SD</td>
<td>53(63.9)</td>
<td>49(62.0)</td>
<td>102(63%)</td>
</tr>
<tr>
<td>4SD</td>
<td>9(10.8)</td>
<td>7(8.9)</td>
<td>16(9.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.1.1) shows that distribution wasting of the children by sex. Majority of children (63.9%) of males were moderately wasted while (62.0%) of females were moderately wasted. This finding agree with report by UNICEF, (2013) showed that in sub-Saharan Africa, near 1 in 10 children under the age of five years were wasted in 2011 to prevalence that has decreased about 10 per cent since 1990.
Table (4.1.2) Distribution of Mid-upper Arm Circumference (MUAC) of children under five according to sex in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Classification / cut off point</th>
<th>Male f (%) N=83</th>
<th>Female’s (%) N=79</th>
<th>All sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sever</td>
<td>16(19.3)</td>
<td>14(17.7)</td>
<td>30(18.5%)</td>
</tr>
<tr>
<td>moderate</td>
<td>49(59.0)</td>
<td>47(59.5)</td>
<td>96(59.3%)</td>
</tr>
<tr>
<td>At risk</td>
<td>6(7.2)</td>
<td>6(7.6)</td>
<td>12(7.4%)</td>
</tr>
<tr>
<td>Normal</td>
<td>12(14.5)</td>
<td>12(15.2)</td>
<td>24(14.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.1.2) show that majority of children MUAC (59.3%) were 11.5cm-12.5cm (were moderately malnourished). This finding agree with studies in Sudan, kabkabiyia by WFP, (2010) this indicated that area had experienced a high global acute malnutrition rate (>15%) among children under five years for the past 5 years while food security managements indicated that the town was relatively better off in terms of food security compare to others areas in North Darfur, Sudan.

4.2: Breast feeding and vaccination status:

4.2.1: breast feeding children under five among respondents mothers in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Breast feeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>112</td>
<td>69.1%</td>
</tr>
<tr>
<td>No</td>
<td>50</td>
<td>30.9%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.2.1) shows that majority (69.1%) of respondents mothers were breast feed their child. This is good indicated of benefits of infant’s breast feeding in prevention of diarrhea. This finding agree with report by Unicef (2009) (B), that indicated breast feeding care practices are influenced by early initiation of breast feeding and should start immediately from birth.
Breast feeding contains unique immunological properties which protect children against infection and chronic disease.

**Table (4.2.2) duration of breast feeding month’s children under five among respondents mothers in Ibrahim Malik Teaching Hospital 2017**

<table>
<thead>
<tr>
<th>Duration of breast feeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under -6 months</td>
<td>28</td>
<td>25%</td>
</tr>
<tr>
<td>6-12 months</td>
<td>65</td>
<td>58%</td>
</tr>
<tr>
<td>12-18 months</td>
<td>12</td>
<td>10.7%</td>
</tr>
<tr>
<td>18-24 months</td>
<td>7</td>
<td>6.5%</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table (4.2.2) Shows that majority (83%) of respondents mothers revealed that the duration of breast feeding infants were less than one years. Exclusive breast feeding in the first 6 month of life have benefits for child and mother. This finding agree with WHO (2003) which recommends exclusive breast feeding for the first 6 months of life and continued breast feeding complemented with appropriate food up to two years old and beyond.

**Table (4.2.3) Type of feeding children under five among respondent’s mothers in Ibrahim Malik Teaching Hospital 2017**

<table>
<thead>
<tr>
<th>Type of feeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding</td>
<td>112</td>
<td>69.1%</td>
</tr>
<tr>
<td>Bottle Feeding</td>
<td>50</td>
<td>30.9%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.2.3) Shows that majority (69.1%) were breast feeding. This finding might be associated with improper cleaning of bottles and agree with study conducted in Ethiopia by Brike (2008) who found that bottle method of feeding was more likely to be associated with diarrhea disease because of inadequate hygienic practices in terms of poor sterilization techniques.
Figure (4.2.1): Supplementary feeding children under five in Ibrahim Malik Teaching Hospital 2017.

Figure (4.2.1) shows that majority (79.6%) of children had been introduced to other food. This agree with study done in Nairobi by Murage, et, al,(2011) who found that mother give porridge, water and juices to the most common complementary foods given to infants.

Table (4.2.4) Age of supplementary feeding children under five in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Age of supplementary feeding</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 2 months</td>
<td>56</td>
<td>34.6%</td>
</tr>
<tr>
<td>2-4 months</td>
<td>43</td>
<td>26.5%</td>
</tr>
<tr>
<td>4-6 months</td>
<td>20</td>
<td>12.3%</td>
</tr>
<tr>
<td>More than 6 months</td>
<td>10</td>
<td>6.1%</td>
</tr>
<tr>
<td>No answer</td>
<td>33</td>
<td>20.4%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.2.4) shows that majority the age of child when supplementary feeding (34.6%) were started under 2 months. Study done in India by Sasi Kumar, et al,(2015) who found that (52%) the majority of mothers supplementary feeding initiated below 6 months.
Table (4.2.5) Distribution of mother’s knowledge of breast feeding about reduction of diarrheal infection in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Knowledge of breastfeeding</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>29.0%</td>
</tr>
<tr>
<td>No</td>
<td>115</td>
<td>71.0%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.2.5) shows that majority (71%) of respondents mother were have no knowledge on the role of breast feeding in reduction of diarrheal. Mostly of the mothers poor knowledge they need awareness breast feeding is very important of children to prevent diarrheal disease. Study conducted by Chung, et al, (2007). Who found that breast feeding can reduce the risk of diarrhea on infants of less than one year of age compared to non-breastfed infants. Breast milk includes IgA (secretary immunoglobulin A). SIgA has as a role in the local protection on the mucous layer of the digestive track. the role of breastfeeding in reducing infection of disease.

Table (4.2.6) Immunization status of the children under five in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Immunization status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>33</td>
<td>20.4%</td>
</tr>
<tr>
<td>Partial</td>
<td>96</td>
<td>59.3%</td>
</tr>
<tr>
<td>No immunization</td>
<td>33</td>
<td>20.4%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.2.6) indicated that more than half of children (59.3%) had been immunized partially. This finding is different with report of WHO (2009) which revealed that the population adhered to the immunization procedure of the children under five years of age promptly except for few who did not.
4.3: Socio-economic factors

Table (4.3.1): Educational level of mothers with children under five years of age in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Education level of mothers</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>93</td>
<td>57.4%</td>
</tr>
<tr>
<td>Basic school</td>
<td>29</td>
<td>17.9%</td>
</tr>
<tr>
<td>Primary</td>
<td>15</td>
<td>9.3%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>15</td>
<td>9.3%</td>
</tr>
<tr>
<td>University</td>
<td>10</td>
<td>6.2%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.3.1) shows that the majority of mothers were illiterate (57.4%), while (17.9%) were basic school. This is an indicator of poor knowledge about prevention and control of disease and reflex family health.

This is result is agree with the study done in Iraq. By(SeterSiziya, et al, 2009). The finding on maternal education proposed that mothers with higher education experienced better chance of a child being spared of diarrhea compared to lower education mothers controlling.

This is probably due to education provides important information about personal and environmental hygiene, weaning and feeding practices, and disease symptoms which boosts timely action on childhood illness.
Figure (4.3.1) Occupation of mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.3.1) shows that majority of mothers were (66.0%) housewives, while (18.5%) were farmers; the study indicates that the mothers were housewives. That is good mostly of mothers to take care of their children. This result is in agreement with study done in Iran by Ghasemi, et al. (2013) who reported that the mothers who work have no the opportunity to get information from deference sources like newspaper, television and radio as the nature of their work makes them busy but housewives have sufficient time to gain information difference sources.

Figure (4.3.2) marital status of mothers with children under five in Ibrahim Malik Teaching Hospital 2017
Figure (4.3.2) shows that half of the mothers (50.0%) were married. This result is agree with the finding reported by KNBS (2010) who found that (55%) of the women were married. The single mothers were widowed, divorced or separate. Some of these mothers tend to leave their children with caretakers who are poorly trained on child care and are poorly paid as they look for jobs to meet the family needs. Some who can’t afford caretakers carry their infants to their workplace which often is unhygienic hence predispose the infants to risk of diarrhea.

Table (4.3.2): Educational level of fathers with children under five years of age in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Education level of fathers</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>46</td>
<td>28.4%</td>
</tr>
<tr>
<td>basic school</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>Primary</td>
<td>30</td>
<td>18.5%</td>
</tr>
<tr>
<td>secondary school</td>
<td>44</td>
<td>27.2%</td>
</tr>
<tr>
<td>University</td>
<td>26</td>
<td>16.0%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The study in table (4.3.2) shows that the majority of fathers were illiterate (28.4%). This result is agree with study done in Bangladesh by Nahar, et al, (2010) who reported that fathers who completed <5 years of education had 1.5 increased risk of having a child presenting with diarrhea. Illiterate or less educated parents usually have less knowledge on children practices and optimal environmental and personal hygiene and they generally have less status in the society thereby rendering them less capable of providing adequate child care and accessing formal health services.
Table (4.3.3): Occupation of fathers with children under five years of age in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Occupation of fathers</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>80</td>
<td>49.4%</td>
</tr>
<tr>
<td>Employed</td>
<td>30</td>
<td>18.5%</td>
</tr>
<tr>
<td>Self employed</td>
<td>39</td>
<td>24.1%</td>
</tr>
<tr>
<td>Others</td>
<td>13</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.3.3): shows that the majority of fathers (49.4%) were farmer. This indicated that most of children who were malnourished belonged to parents who were most farmers. This result is in agreement with study done in Malawi by Masangwi, et al. (2010) who reported that the farther job or poor income of head of the house hold is risk factors for diarrheal diseases.

Figure (4.3.3) Distribution of parents according to religion in Ibrahim Malik Teaching Hospital 2017

Figure (4.3.3) shows that the majority of the parents were Muslims, (69%) while (31%) were Christian. Religion is an important factors in determined the dietary habit.
Table (4.3.4) Distribution of family income per month among children under five years of age in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Family income</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 1000SDG</td>
<td>64</td>
<td>39.5%</td>
</tr>
<tr>
<td>2000 - 2500 SDG</td>
<td>58</td>
<td>35.8%</td>
</tr>
<tr>
<td>2500 - 3000 SDG</td>
<td>28</td>
<td>17.3%</td>
</tr>
<tr>
<td>More than 3000SDG</td>
<td>12</td>
<td>7.4%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.3.4) shows that majority of children (39.5%) had income per month less than 1000SDG. This is indicated that the family income per month as a factor related to low standard of hygiene a strong relationship with diarrhea. This finding disagrees with previous studies in Pakistan by Urrehman, et al., (2008) who found that, the sources of live hoods were farming, wage earners, self-employed, business, and remittances.

![Family size distribution chart](image)

**Figure (4.3.4) Family size of children under five years of age in Ibrahim Malik Teaching Hospital 2017.**

Figure (4.3.4) shows that the majority of family size (30.3%) were (3-4) persons. As the family size of the household becomes higher, there may be crowding which deteriorates the hygiene condition, which in turn increases the probability of contact with pathogens. Also there may be a
competition for mother’s attention and other resources. This finding agree with finding reported by Andualem, et al. (2010). Who found that greater family size was associated with under five children diarrhea. There might be a difference in maternal attention and general living standard that could explain the discrepancy.

4.4: knowledge of diarrhea disease

Figure (4.4.1) Knowledge of mothers of children under five about diarrhea in Ibrahim Malik Teaching Hospital - 2017

Figure (4.4.1) shows that the majority of mothers (52%) had poor knowledge about diarrheal disease. This finding disagree with study by Hackett, et al. (2012) who found that (88%) of mothers knew the correct definition of diarrhea disease. The mother’s level of knowledge may help to access health care in formation and may have an awareness of diarrhea prevent and control.
Table (4.4.1) Knowledge of mothers of children under five about the signs and symptoms of diarrhea in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>Cramps</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>Nausea</td>
<td>32</td>
<td>19.8%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>81</td>
<td>50.0%</td>
</tr>
<tr>
<td>Blood in stool</td>
<td>17</td>
<td>10.5%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.4.1) shows that half of mothers (50%) mentioned that vomiting is common signs and symptoms of diarrheal disease. These finding are consistence with the result reported by studies conducted by Ansari, et al, (2011) who found that most Africa were ignorant about the danger signs of diarrhea disease.

Figure (4.4.2) Knowledge of mothers of children under five about causes of diarrhea disease in Ibrahim Malik Teaching Hospital 2017.

Figure (4.4.2) shows that (30.8%) of respondent the germ infection are most caused of diarrhea diseases. This indicated the alack of maternal education that leads to the common practice of
withholding food during acute episodes of diarrhea out of fear that eating will exacerbate the symptom. This result agree with study done in India by Kuberan et al, (2015) who reported that germs infection as the major perceived cause of diarrhea disease.

**Table (4.4.2) Distribution of children under five according to dehydration status due to diarrheal disease in Ibrahim Malik teaching hospital 2017.**

<table>
<thead>
<tr>
<th>Patients dehydration status</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>47</td>
<td>29.0%</td>
</tr>
<tr>
<td>Moderate</td>
<td>81</td>
<td>50.0%</td>
</tr>
<tr>
<td>Severe</td>
<td>34</td>
<td>21.0%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.4.2) shows that half of the children (50.0%) were dehydrated. This indicated the needs of awareness to decrease risk factors diarrheal disease. Study conducted in Tanzania by Nicholas (2009). Who found that 73.3% patients with no dehydration or some dehydration had correct rehydration fluid administrated.

**Table (4.4.3) Patient’s frequency of stool of diarrhea among children under five in Ibrahim Malik Teaching Hospital 2017.**

<table>
<thead>
<tr>
<th>Patients frequency of stool</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4 times</td>
<td>96</td>
<td>59.3%</td>
</tr>
<tr>
<td>4-5 times</td>
<td>50</td>
<td>30.9%</td>
</tr>
<tr>
<td>more than 6 times</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.4.3) shows that the majority frequent of stool (59.3%) were between 2-4 times. This might be causes of dehydration and loss of appetite which is followed by decreased food intake and then malnutrition. This result agrees with study conducted in rural Bangladesh by Roy (2004). Who found that children who had diarrhea were 2 times more likely to be under weight than those who did not have.
Figure (4.4.3) Knowledge of mothers of children under five about treatment of diarrhea in Ibrahim Malik Teaching Hospital 2017.

Figure (4.4.3) shows that approximately half of mothers (49.3%) were used medical treatment for diarrhoeal diseases. Some mothers gave homemade fluid like rice water, yoghurt, lemon juice, garlic, tea to stop diarrhea, another mothers gave ORS to their children. These results disagree with study conducted in Nigeria by Osonwa, et al. (2016) who found the majority of mothers have used traditional treatment diarrhea for their children.

Table (4.4.4) Knowledge of mothers of children under five about preventing of diarrhea in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Way of preventing diarrheal</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have knowledge</td>
<td>32</td>
<td>19.8%</td>
</tr>
<tr>
<td>Do not have knowledge</td>
<td>130</td>
<td>80.2%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.4.4) shows the distribution of mothers according to their knowledge about the ways for preventing diarrhea disease it indicated that majority (80.2%) had poor knowledgeable about the way of preventing diarrheal disease. Hand washing with soap, drinking clean water, eat clean, fresh vegetable and continuous breastfeeding reduce and prevent diarrhea disease. Study
conducted in Gambia by Sillah (2012). Who found that 65% mothers perceived the importance of personal hygiene for prevention diarrhea diseases.

Figure (4.4.4) knowledge of mothers about ORS in Ibrahim Malik Teaching Hospital 2017

Figure (4.4.4) shows that majority of respondents mothers (80.2%) were not know ORS. This finding agree with study in Delhi by Priti, et al, (2014) who found high knowledge of ORS among mothers.

4.5: Sanitation and disposal factors

Figure (4.5.1) Distribution availability of latrine in household of respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017.
Figure (4.5.1) Shows that the majority of mothers respondent(89.5%) have latrine in their households. Most infections pass through a fecal oral route. This finding agree with WHO (2002) who reported an estimated of 24% of all deaths in children under 5 years are due to environmental related diarrhea, malaria and respiratory infections.

Table (4.5.1) Distribution of latrine types of respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Types of latrine</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flush / pour flush to septic tank</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>flush / pour flush to pit latrine</td>
<td>34</td>
<td>21.0%</td>
</tr>
<tr>
<td>Ventilated improved pit latrine</td>
<td>30</td>
<td>18.5%</td>
</tr>
<tr>
<td>Pit latrine without slab</td>
<td>65</td>
<td>40.1%</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>10.5%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.5.1) Show that majority of households (40.1%) have Pit latrine without slab. Use of unimproved sanitation facilities is ones that don’t ensure hygienic separation of human excreta from human contact and they include pit latrines without a slab, hanging latrines and bucket latrines. This finding agree with study in Iran by Kolahiet, al, (2008) Who found where there was a strong association between the presence of feces in the yard and non-flush toilets with under five childhood diarrhea morbidity. But acute children diarrhea presence was associated with latrine availability.
Figure (4.5.2) Distribution of latrine ownership in household of respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017.

Figure (4.3.2) shows that majority (79.6%) own private latrine. Sharing a latrine reduce the hygienic level of the latrine. The findings that irregular latrine cleaning and latrine-sharing among many people are associated with the risk of diarrheal disease. This finding agree with study conducted in turkey by Velipasaoglu et al. (2004) who found that unhygienic latrines and sharing latrines increased the risk of diarrheal diseases. This situation, cleaning the latrine less than 3 times per week was considered irregular more people.

Table (4.5.2) Practice of latrine cleaning of respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Latrine cleaning</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every day</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>1-2 times weeks</td>
<td>81</td>
<td>50.0%</td>
</tr>
<tr>
<td>Not cleaned</td>
<td>65</td>
<td>40.1%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.5.2) shows that half of latrines (50.0%) were cleaned 1-2 times a week, uncleaned latrines associated with an increased risk of diarrhea disease. Cleaned latrine reduces rate of...
diarrhea disease in children. A study conducted in Bangladesh by Bhuiya (2000) who found that provision of clean latrines reduced diarrhea episodes and also changed attributable and relative risk.

- **Figure (4.5.3)** Distribution of solid waste storage among mothers respondent in Ibrahim Malik Teaching Hospital 2017

Figure (4.5.3) shows that approximately half (48.7%) of solid waste stored outside the house. This is an indication that disposal of waste outside the house is a risk factor for diarrhea. Study conducted in Ethiopia by Girma (2008) who found that disposal of waste around the house was a risk factor for diarrhea disease. Solid waste was associated with a high rate with the prevalence of diarrhea.
Figure (4.5.4) presence of livestock in houses of children under five years of age in Ibrahim Malik Teaching Hospital 2017

Figure (4.5.4) shows that majority of mothers (77%) had animals in their house, animals in house increases unhygienic condition of the household and probability of getting zoonotic disease. These results agree with the study conducted in Guinea Bissau by Kare, et al., (2002) who reported that having domestic animals in the house is risk factors for diarrhea disease.

4.6: Hygiene and other domestic factors

Figure (4.6.1): Practice of hands washing with soap after latrine use among respondent’s mothers with children under five in Ibrahim Malik Teaching Hospital 2017
Figure (4.6.1) shows that half (50.0%) wash their hands with soap after using the toilet. This result agrees with the study conducted in Bangladesh by Leslie, et al. (2014) who found that children whose mothers wash their hand with water and soap/ash were less likely to develop diarrhea compared to children whose mothers wash their hand with water only.

Figure (4.6.2) Practice of hands washing with soap after helping child defecate among respondents' mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.6.2) shows that half of mothers (51%) wash hands with soap after helping child defecation. This result agrees with the study conducted in Ethiopia by Siziya, et al. (2009) who found that hand washing after latrine use and after helping child defecation had a lower chance of diarrhea infection than those without hand washing.
Figure (4.6.3) Practice of hands washing with soap before feeding the child among respondent’s mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.6.3) shows that approximately half (45.0%) wash hands with soap before feeding the child. Poor hand washing related practices is a risk of diarrhea among children whose mothers was 4.5 times higher than that among those whose mothers paid attention to washing their hand before feeding children. Study conducted in Nigeria by Yilgwan (2005) who found that mothers were the main caregivers for their children they should wash their hands before feeding infants and children to tackle the occurrence of hygienerelated disease.

Table (4.6.1) practice of hands washing with soap before preparing food the child under five among respondents mothers in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Hand washing</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>66</td>
<td>40.7%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>33</td>
<td>20.4%</td>
</tr>
<tr>
<td>Usually</td>
<td>63</td>
<td>38.9%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Table (4.6.1) shows that approximately half (40.7\%) wash their hands with soap before preparing foods for child. This low proportion indicated that mothers who did not wash hands with soap before prepared foods for child had increased risk of diarrhea. These results agree with study conducted in Southern Sudan by Juba (2010) who found that hand washing with soap before preparing food was generally practiced by small fraction of the community, the low rate of hand washing attributed to low awareness of the oral-faecal contamination chain.

Figure (4.6.4) Distribution of hands washing practices by mother’s respondents in Ibrahim Malik Teaching Hospital 2017

Figure (4.6.4) shows that approximately half of respondents (46.3\%) were used water only and (43.8\%) were used water and soap. These results agree with the studies conducted in Bangladesh by Leslie Danquah, et al. (2014) who found that mothers whose wash their hand with water and soap/ash were less likely to develop diarrhea compared to children whose mothers wash their hand with water only.
Figure (4.6.5) Distribution of storing cooked foods for later used among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.6.5) shows that majority (70.9%) stored cooked foods for later used. This is indicator the under hot weather conditions and without refrigeration; food is easily contaminated by pathogens. WHO, (1992) (A). Reported that foods that are cooked immediately prior to consumption are safe than those which have been cooked and stored at ambient temperature. Improper storage or holding temperature is common factor contributing to food borne illnesses. Food borne microorganisms grow rapidly between 5 C and 60 C and most bacteria grow rapidly between 25 C and 40°C. Furthermore it is recommendation that prepared food should be kept at temperature of at least 60°C if it should be kept for more that 4-5 hours.
Figure (4.6.6) Practice of washing fresh foods among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.6.6) shows that majority(79.6%) of respondent mothers were washed fresh foods. While (20.3%) of mothers were not washed fresh food. This is an indication that mother have positive attitude towards prevention of diarrhea disease. This result is agree with study by Bruhan, (2002). Who found that60% of mothers washed fresh food to remove germs and bacteria to improve their safety. It is the only method to reduce pathogen.

Table (4.6.2) Practice of cleaning utensils or container for feeding child under five among respondent mothers in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Cleaning utensils</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water only</td>
<td>50</td>
<td>30.9%</td>
</tr>
<tr>
<td>Hot water only</td>
<td>15</td>
<td>9.3%</td>
</tr>
<tr>
<td>Water with soap</td>
<td>65</td>
<td>40.1%</td>
</tr>
<tr>
<td>Hot water with soap</td>
<td>32</td>
<td>19.8%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Table (4.6.2) shows that majority of respondents mothers (40.1%) were used water and soap when cleaned utensils for feeding the child. Contaminated utensils, indirectly causing diarrheal disease in children.

Table (4.6.3) practice of buying foods from street vendors for children under five among respondents mothers in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Buy food from street vendors</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>132</td>
<td>80.2%</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>19.8%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.6.3) Shows that majority (80.2%) were bought foods from street vendors for your children. that indicated incidence of childhood diarrhea involving food contamination. This result agree with study conducted in Ghana by Mensah, et al, (2002) who found that high incidence of diarrhea among children whom consumed were street food. A large proportion of vendor prepare food to be contaminated with unacceptable levels of bacteria, there are health risks associated with the use of fingers to feel foodstuffs and ingredients for texture to ascertain the adequacy of manual grinding since this can contribute to the microbial load of food.

Figure (4.6.7) the presence of flies in the kitchen among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017
Figure (4.6.7) show that most of mothers (70.3%) were observed present of flies in their kitchen. Study conducted in Turkey by Etiler, et al, (2004) who found that mostly of Families often use wood, coal, or even fallen leaves for cooking. Storage of these materials in the kitchen facilitates the development of diarrhea transmitting vectors, such as flies and cockroaches. In addition, when the kitchens are built close to live stock stables or poultry feeding place, it might cause an unhygienic situation of kitchen. Based on these realities, cleaning the kitchen 3 times or less per week was considered irregular. The risk of diarrhea among children whose parents cleaned kitchen irregularly was 4.3 times higher than among those whose parents cleaned kitchen every day’s.

4.7: water sources and related factors

Table (4.7.1) water source among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

<table>
<thead>
<tr>
<th>Source of water</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe</td>
<td>64</td>
<td>39.5%</td>
</tr>
<tr>
<td>River</td>
<td>33</td>
<td>20.4%</td>
</tr>
<tr>
<td>Stream</td>
<td>16</td>
<td>9.9%</td>
</tr>
<tr>
<td>Canal</td>
<td>49</td>
<td>30.2%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table (4.7.1) shows that (39.5%) of respondents were revealed that pipes are the sources of drinking water supply. This finding indicated the access to safe water that have a positive impact in reduction of diarrhea prevalence and duration as most of diarrheal causing microorganism are mainly transmitted through the water. This finding disagrees with study in Nairobi by World Bank (2006) who found that (60%) of households depend on water vendors for their water supply.
Table (4.7.2) Water storage in the household among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017.

<table>
<thead>
<tr>
<th>Water storage</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrel</td>
<td>81</td>
<td>50.0%</td>
</tr>
<tr>
<td>container</td>
<td>47</td>
<td>29.0%</td>
</tr>
<tr>
<td>Others</td>
<td>34</td>
<td>21.0%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The study in table (4.7.2) Shows that half (50.0%) of respondent mother were stored water in barrel. These results is in agreement with study conducted in southwest Ethiopia by Teklemariam, *et al.*, (2000) who have demonstrated higher prevalence of diarrhea in children from households where water obtained from storage container by dipping than in those where water is obtained by pouring.

Figure (4.7.1) Water treatment among respondents mothers with children under five in Ibrahim Malik Teaching Hospital 2017

Figure (4.7.1) shows that majority of mothers (80.2%) mentioned that they untreated water. Treatment of water helps to kill organisms as in the case of pipe borne water. Therefore
untreated water still contains vibrant strains of these microorganisms which when taken into the system will certainly cause the individual to be sick. This result agrees with previous study by Kundu, (2010). Who found family used water boiled water was (9.8 %). During focus group discussion (FGD): some mothers said the water in the residential area is bad when it is not boiled and should not be drink, when asked if they regularly treat drinking water some of the mothers said we don’t have time to boil the water. And others said cannot afford fuel to boil the water due to poverty.

4.8: Laboratory results

The patients investigated were suffering from diarrhea. According to the etiology fecal examination.

Table (4.8.1) Frequency of pathogens identified in 162 stool samples

<table>
<thead>
<tr>
<th>pathogens</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giardia lamblia</td>
<td>38</td>
<td>23.5%</td>
</tr>
<tr>
<td>Shigella</td>
<td>25</td>
<td>15.4%</td>
</tr>
<tr>
<td>E coli</td>
<td>17</td>
<td>10.5%</td>
</tr>
<tr>
<td>Rota virus</td>
<td>20</td>
<td>12.4%</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td>7</td>
<td>4.3%</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>66.1%</td>
</tr>
<tr>
<td>No rejected</td>
<td>55</td>
<td>34%</td>
</tr>
<tr>
<td>Total</td>
<td>162</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table (4.8.1) investigates that 107% samples (66.1%) were positive to pathogen causing diarrhea. The results that detected (23.5%) were Giardia lamblia, Shigella was detected (15.4%), E coli were (10.5%), Rota virus was (12.4%) and Entamoeba histolytica cysts was detected (4.3%), respectively.
CHAPTER Five

Conclusion and recommendation

4.1. Conclusion

The data was obtained from 162 mothers with under five children attending at Ibrahim Malik Teaching Hospital 2017.

- The result of the study showed that the factors: male children were more infected than females (51.2%).
- Most of infected children were in age of one and two years (1-2) years (46.3%) respectively.
- (63%) of the children were found to be at risk of moderately malnutrition.
- Low educational level of mothers showed that 57.4% were illiterate.
- The findings show most families have low income 39.5%. Most of mothers in the study showed poor knowledge preparing ORS.
- Factors associated with diarrheal disease in the study population: were breast feeding, low household income, poor hand washing practices, low parental education, drinking untreated or unboiled water and irregular latrine cleaning were significantly associated with diarrheal disease.

Ecoli, giardia lamblia, shigella, rotavirus and entamoeba histolytica are found to be common pathogens causing diarrhea among hospitalized children.
4.2: RECOMMENDATIONS

- To mothers:
  - Encourage mothers to wash their hands with soap before feeding children or after going to toilet.
  - Encourage mothers/caretakers to vaccinate their children as a way of prevention of diarrhea infections to their children.
  - Encourage mothers to continue breast feeding during diarrheal disease.

- To governments:
  - Provide retrovirus vaccination
  - Invest in safe drinking water, hygiene and sanitation infrastructure.
  - Support clear and targeted health promotion and behavior change program

- To communities:
  - Support and promote importance of community health workers
  - Ensure safe water is provided close to people’s homes
  - Discourage/eliminate open defecation
  - Develop strategies for proper disposal of human waste
  - Promote hand washing.
REFERENCES


Chein Hung Chang (2005): Impact of Control on Childhood Diarrhea in Pakistan No 45.


Southern Sudan Juba (2010): knowledge attitude practice (KAP) survey water sanitation hygiene and nutrition, 7 stated of southern Sudan juba: UNICEF WES and Health and Nutrition section southern Sudan, final report No: 77.


Appendix I
CONSENT FORM

My name is Sadia Hassan Hussein and I am master’s student of public health Faculty of health and environmental sciences. I am here to conduct a study on risk factors influence of diarrhoea disease among children under five years old in Ibrahim Malik teaching hospital Khartoum state. The purpose of this consent form is to give you information you will need to help you decide whether to participate in the study. Please read this form carefully. You are free to ask any question about the study.

Thank you.

Date: …../……./2017.

Interviewee’s signature: ……………….

Interviewer’s signature: ………………..

Appendix II
University of Gezira
Faculty of health and environmental sciences

Questionnaire: Risk factors of diarrhoea disease among children under five years of age in Ibrahim Malik Teaching hospital Khartoum state-Sudan 2017.

Questionnaire no

Section 1: Demographic and socio-economic information

Respondent no (  )

1:1: Age of child: a) under 1 year (  ) b) 1-2 years (  ) c) 2-3 years (  ) d) 3-4 years (  ) e) 4-5 years (  )

Weight kg:

Height cm:

Weight for height: a) -2SD (  ) b) -3SD (  ) c) -4SD (  )

MUAC:
a) >11.5 cm (  ) b) 11.5-12.5 cm (  ) c) 12.5-13.5 cm (  ) d) >13.5 cm (  )

1:2: Sex:

   a) Male (  )  b) female (  )

1:3: Order of child:

   a) First (  ) b) second (  ) c) third (  ) d) fourth (  ) e) fifth on wards (  )

1:4: Residence:

   a) Urban (  ) b) rural (  )

Section 2: Breast feeding and vaccination status

2.1: Do you breast fed your child?

   a) Yes (  ) b) no (  )

For how long did you breastfed your child?.

   a) Under 6 months (  ) b) 6-12 months (  ) c) 12-18 months (  ) d) 18-24 months (  )

2.2: Type feeding.
a) Breastfeeding ( )  b) Bottle Feeding ( )

2.3: Does the child take other food than breast milk?
   a) Yes ( )  b) No ( )

2.4: When did you give the child other food with breast feeding?
   a) Under 2 months ( )  b) 2-4 months ( )  c) 4-6 months  d) more than 6 months ( )

2.5: Do you know that breastfeeding adequately will reduce infections in a child?
   a) Yes ( )  b) No ( )

2.6: Child immunization status
   1: Complete ( )  2: partial ( )  3: No immunization

If no immunization why

Section 3: socio-economic factors of parents

3:1: Education level of mother:
   a) Illiterate ( )  b) basic school ( )  
   c) Intermediate ( )  d) secondary school ( )  e) university ( )

3:2: Education level of father:
   a) Illiterate ( )  b) basic school ( )  
   c) Intermediate ( )  d) secondary school ( )  e) university ( )

3:3: Occupation of mother:
   a) farmer ( )  b) employed ( )  c) housewife ( )  d) professor ( )

3:4: Occupation of father:
   a) farmer ( )  b) employed ( )  c) self-employed ( )  d) others ( )

3:5: Marital status of mother:
   a) Married ( )  b) divorced ( )  
   c) Windowed ( )  d) separated ( )

3:6: Religion of parents:
   a) Muslim ( )  b) Christian ( )

3:7: Income per month SDG:
   a) Less than 1000 SDG ( )  b) 2000-2500 SDG ( )  c) 2500-3000 SDG ( )  d) more than 3000 SDG ( )

3:8: Family size:
a) 2-3 persons (   ) b) 3-4 persons (   ) c) 4-5 persons (   ) d) more than 5 (   )

3:9: Do you have following kinds of livestock?
   Yes (   ) no (   )
If yes state types of herd:
   a) Cattle (   ) b) goats (   ) c) chickens (   ) d) Others (   )

3:10: Stool sample collected……………………

Section 4: Knowledge of diarrhoea

4:1: Do you know diarrhea disease?
   Yes (   ) no (   )
If yes what is diarrhea:
   a) Water stool (   ) b) blood in stool (   )

4:2: What are the main signs symptoms of diarrhea
   a) abdominal pain (   ) b) cramps (   ) c) nausea (   ) d) vomiting (   )
   e) blood in stool (   )

4:3: Causes of diarrhea disease
   a) Indigestible food (   ) b) worm infection (   ) c) germs infection (   ) d) others (   )

4:4: Patient’s dehydration status
   a) mild (   ) b) moderate (   ) c) severe (   )

4:5: Frequency of stool:
   a) 2-3 times b) 4-5 times (   ) c) more than 6 times (   )

4:6: Treatment of diarrhea disease
   a) Home fluid (   ) b) medical treatment (   ) c) traditional treatment (   )

4:8 Do you know some of the ways for preventing diarrhea?
   Yes (   ) no (   )
If yes mention ….

4:9: How did you know about diarrhea sign, mood of spread, and prevention?
   a) Television (   ) b) reading (   ) c) radio (   ) d) health worker (   ) e) Others (   )

4:10: Do you know ORS?
   a) Yes (   ) b) No (   )
If yes mention: ………………………………

4:11: Do you prepare ORS?
a) Yes ( ) b) No ( )
If yes description ........................................

Section 5: sanitation and disposal
5:1: Do you have latrine?
    Yes ( ) no ( )
5:2: Type of latrine
    a) Flush / pour flush to septic tank ( )
    b) flush / pour flush to pit latrine ( )
    c) Ventilated improved pit latrine ( )
    d) pit latrine with slab ( )
    e) Pit latrine without slab ( )
    f) other ( )
5:3: Owner ship of latrine
    a) Private ( ) b) shared with neighbors ( )
5:4: How often is the latrine cleaned?
    a) every time it is spoiled ( )
    b) every day ( )
    c) 1-2 times weeks ( )
    d) not cleaned ( )
5:5: Solid waste collection
    a) Outside the-house ( )
    b) in house ( )
    c) transport ( )
5:6: Do you have following kinds of livestock?
    Yes ( ) no ( )
If yes state types of herd:
    a) Cattle ( )
    b) goats ( )
    c) chickens ( )
    d) Others ( )

Section 6: hygiene practices and other domestic
6:1: Do you often wash your hands with soap?
    After use going to toilet:
    a) Never ( )
    b) sometimes ( )
    c) usually ( )
6:2: Do you often wash your hands with soap?
    After helping your child defecate:
    a) never ( )
    b) sometimes ( )
    c) Usually ( )
6:3: Do you often wash your hands with soap?
    Before use eating and feeding your child:
    a) never ( )
    b) sometimes ( )
    c) Usually ( )
6:4: Do you often wash your hands with soap?
    Before preparing foods for your child:
    a) never ( )
    b) sometimes ( )
    c) Usually ( ).
6.5: How do you wash your hands?  
   a) water only (   ) b) water and soap (   ) c) others (   )
6.6: Do you store cooked foods for later used?  
   Yes (   ) no (   )
If yes how do you store the cooked foods?  
   a) In refrigerator (   ) b) room temperature (   )
6.7: Do you wash fresh foods?  
   a) Yes (   ) b) No (   )
If yes a) usually (   ) b) sometimes (   )
6.8: What do you use to clean utensils or container for feeding your child?  
   a) Water only (   ) b) hot water only (   ) c) water with soap (   )
   d) Hot water with soap (   )
6.9: Do you often buy foods from street vendors for your child?  
   1: yes (   ) 2: no (   )
6.10: Do flies present in the kitchen?  
   a) Yes (   ) b) No (   )

Section 7: water related practice
7.1: Water sources  
   a) General (   ) b) River (   ) c) Stream (   ) d) Canal
7.2: Water keeping system  
   a) Barrell (   ) b) aizar (   ) c) others (   )
7.3: What type of water does your family use?  
   a) boiled (   ) b) filtered (   ) c) untreated (   )

Section 8: laboratory results children under five years of age.
استبيان لدراسة عوامل الخطر التي تؤثر على مرض الإسهال بين الأطفال دون سن الخامسة في مستشفى إبراهيم مالك التعليمي - ولاية الخرطوم 2017.

استبيان رقم:

القسم (1): المعلومات الديموغرافية والاجتماعية والاقتصادية:

رقم العينة ( )

1.1 عمر الطفل:

أ. أقل من سنة ( ) ب. 1-2 سنة ( ) ج. 2-3 سنوات ( )

د. 3-4 سنوات ( ) ه. 4-5 سنوات ( )

الوزن (كجم):

الطول (سم):

الوزن عن الطول: أ. 2SD ج: 3SD د: 4SD

Middle Upper Arm Circumference (MUAC)

A: >11.5cm ( ) b: 11.5-12.5cm ( ) c: 12.5-13.5cm ( ) d: >13.5cm ( )

2.1 الجنس:

أ. ذكر ( ) ب. أنثى ( )

3.1 ترتيب الطفل:

أ. الأول ( ) ب. الثاني ( ) ج. الثالث ( ) د: الرابع ( ) ه: أكثر الخامس ( )

4.1 الإقامة:

أ. حضر ( ) ب. ريف ( )
القسم (2): الرضاعة الطبيعية وحالة التقييم

1.2 هل ترضعين طفلك؟
أ. نعم ( ) ب. لا ( )

منذ متى ترضعين طفلك؟
أ. أقل من 6 شهور ( ) ب. 6-12 شهر ( ) ج. 12-18 شهر ( ) د. 18-27 شهر ( )

4.2 أنواع التغذية.
أ. رضاعة طبيعية ( ) ب. حليب صناعي ( )

3.2 هل ينام طفلك بأي غذاء خلاف الرضاعة الطبيعية؟
أ. نعم ( ) ب. لا ( )

4.2 متى أعطيت الطفل طعاماً آخر مع الرضاعة الطبيعية؟
أ. أقل من شهرين ( ) ب. 2-4 شهر ( ) ج. 4-6 شهر ( ) د. أكثر من 6 شهور ( )

5.2 تعلم أن الرضاعة الطبيعية بشكل كاف تقلل من العدوى لدى الطفل؟
أ. نعم ( ) ب. لا ( )

6.2 حالة تطعيم طفلك
أ. كامل ( ) ب. جزئي ( ) ج. لا يوجد تطعيم ( )

إذا لم يكن هناك تطعيم لماذا: .................................................................
القسم (٣): المعلومات الديموغرافية والاجتماعية والاقتصادية:

١.٣ مستوى تعليم الأم:
أ. أمية ( ) ب. مرحلة الأساس ( ) ج. مرحلة متوسطة ( ) د.ثانوي ( )
ه. جامعي ( )

٢.٣ مستوى تعليم الأب: أ. أمية ( ) ب. مرحلة الأساس ( ) ج. مرحلة متوسطة ( ) د.ثانوي ( )
ه. جامعي ( )

٣.٣ عمل الأم:
أ. مزارعة ( ) ب. عاملة ( ) ج. ربة منزل ( ) د. معلمة ( )

٤.٣ عمل الأب:
أ. مزارع ( ) ب. عامل ( ) ج. عمل خاص ( ) د. أخرى ( )

٥.٣ الحالة الاجتماعية للأم:
أ. متزوجة ( ) ب. مطلقة ( ) ج. منفصلة ( ) د. أرملة ( )

٦.٣ دينية الوالدين:
أ. مسلمين ( ) ب. مسيحيين ( )

٧.٣ الدخل الشهري (بالجنيه):
أ. أقل من ١٠٠٠ ج ( ) ب. ١٠٠٠-٢٥٠٠ ج ( ) ج. ٢٥٠٠-٣٠٠٠ ج ( )
د. أكثر من ٣٠٠٠ ج ( )

٨.٣ حجم الأسرة:
القسم (4): معرفة الأسهال

1.4 هل تعرف مرض الأسهال؟

نعم ( ) لا ( )

إذا كانت الإجابة بنعم ما هو الأسهال؟

أ. براز سائل ( ) ب. دم في البراز ( )

2.4 ما هي العلامات الرئيسية لاعراض الأسهال؟

أ. آلام في البطن ( ) ب. تشتنجات ( ) ج. غثيان ( ) د. قيء ( )

3.4 ما هي أسباب مرض الأسهال؟

أ. الغذاء غير القابل للهضم ( ) ب. عدوى الدودة ( ) ج. عدوى الجراثيم ( )

د. أخرى ( )

4. حالة جفاف المريض

أ. معتدل ( ) ب. غير شديد ( ) ج. شديد ( )

5.4 عدد مرات التبرز

أ. 2-4 مرة ( ) ب. 4-5 مرة ( ) ج. أكثر من 6 مرات ( )

6.4 علاج مرض الأسهال
ًأ، علاج منزلي ( ) ب، علاج طبي ( ) ج، علاج تقليدي ( )

4. هل تعرف بعض الطرق لعلاج الاسهال؟
أ، نعم ( ) ب، لا ( )

إذا كانت الإجابة بنعم وضح

8.4 هل تعرف ORS؟
أ، نعم ( ) ب، لا ( )

إذا كانت الإجابة بنعم أذكر

9.4 هل تقوم بإعداد ORS؟
أ، نعم ( ) ب، لا ( )

إذا كانت الإجابة بنعم أوصف

القسم (5): الصرف الصحي والتخلص منه

1.5 هل لديك مرحاض؟
أ، نعم ( ) ب، لا ( )

2.5 نوع المرحاض
أ، تدفق إلى الصرف الصحي ( ) ب، تدفق إلى حفرة المرحاض ( ) ج، مرحاض محسن

التهوية ( ) د، حفرة ب بلاطة ( ) ه، حفرة بدون بلاطة ( ) و، أخرى ( )

3.5 ملكية المرحاض
4.5 كيف يتم تنظيف المرحاض
أ. كلما يتسمخ ( ) ب. كل يوم ( ) ج. مرة أسبوعيا ( ) د. لا ينظف ( )

5.5 جمع اللفائف الصلبة
أ. خارج المنزل ( ) ب. داخل المنزل ( ) ج. يتم ترحيله ( )

6.5 هل لديك أي نوع من الماشية؟
أ. نعم ( ) ب. لا ( )

إذا كانت الإجابة بنعم حدد أنواع الماشية
أ. ماعز ( ) ب. ضأن ( ) ج. دواجن ( ) د. أخرى ( )

القسم (6): طرق النظافة في المنزل
6.1 هل دائما تغسل يديك بالصابون بعد استخدامك للحمام؟
أ. أبدا ( ) ب. أحيانا ( ) ج. دائما ( )

2.6 هل تغسلين يديك بالصابون بعد تنظيف طفلك من التبول؟
أ. أبدا ( ) ب. أحيانا ( ) ج. دائما ( )

3.6 هل تغسلين يديك بالصابون قبل تغذية طفلك؟
أ. أبدا ( ) ب. أحيانا ( ) ج. دائما ( )

4.6 غالبا ما تغسلين يديك بالصابون قبل إعداد الأطعمة لطفلك؟
أ. أبدا ( ) ب. دائما ( ) ج. أحيانا ( )
5.6 كيف تفصلين بديك؟
أ. بالماء فقط  ( )  ب. بالماء والصابون  ( )  ج. أخرى  ( )

6.6 هل تخزينين الأطعمة المطبوخة لاستخدامها في وقت لاحق؟
أ. نعم  ( )  ب. لا  ( )
إذا كانت الإجابة بنعم كيف تخزينين الأطعمة المطبوخة؟
أ. في الثلاجة  ( )  ب. في درجة حرارة الغرفة  ( )

7.6 هل تفصلين الأطعمة الطازجة؟
أ. نعم  ( )  ب. لا  ( )
إذا كان الجواب: أ. أحيانا  ( )  ب. دائمًا  ( )

8.6 ماذا تستخدمين لتنظيف الأواني وحافظة غذاء طفلك؟
أ. بالماء فقط  ( )  ب. بالماء والصابون  ( )  ج. بالماء الساخن  ( )  د. بالماء الساخن والصابون  ( )

9.6 هل غالباً ما تشتري الأطعمة من الباعة المتجولين لطفلك؟
أ. نعم  ( )  ب. لا  ( )

10.6 هل يوجد ذيبان في المطبخ؟
أ. نعم  ( )  ب. لا  ( )

القسم (7): الممارسات المتعلقة بالمياه:
1.7 مصادر المياه
Appendix III: Focus group discussion questions

1: What is diarrheal disease?

2: What are sign and symptoms of diarrhea disease?

3: What are types of diarrhea disease?
4: What are causes of diarrhea disease?
5: What are the risk factors of diarrhea disease?
6: What are complications of diarrhea disease?
7: What is the mode transmission of diarrhea disease?
8: What are treatments of diarrhea disease?
9: What are the preventions of diarrhea disease?
10: What is the vaccine for diarrhea disease?

Focus on group discussion

1: Mostly of mothers defined diarrhea disease appropriately.
2: Sign and symptoms of diarrhea disease mostly of mothers mentioned abdominal pain, nausea and vomiting.
3: Causes of diarrhea all mothers participants in focus group discussion mentioned different factors but no one mentioned more than two factors. For example, some of mothers mentioned teething as the main cause of diarrhea disease.

4: Risk of diarrhea mostly mothers did not know risk of diarrhea disease.

5: Transmission of diarrhea all mothers mentioned contaminated water and food, flies as the ways of transmission of diarrhea disease.

6: Prevention of diarrhea some of mothers mentioned hand washing with soap, drink clean breast feeding continues, and clean eat.

7: Treatment of diarrhea disease some mothers gave homemade fluids, yoghurt, and rice water to their children another mothers gave ORS.