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Assessment of the Knowledge, Attitude & practices of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022

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قال الله تعالى:

Dedication

We would like to dedicate the following people, without whom we would not have been able to complete this research, and without whom we would not have made it:

To our parents for their love, endless support and encouragement throughout my life, thank you both for giving me strength to reach for stars and chase my dreams

To our family deserve wholehearted thanks as well specially

To our friends for your understanding and encouragement in many moment of crisis, we cannot list all name here but you are always in our mind

Acknowledgments

First we wish to thank Allah for granting us the Confidence and Success to complete this study. We would like to say a special thanks to our supervisor who's guided us and encouraged us to carry on through these years and has contributed to this thesis with a major impact. Thank you as well for guiding us often with big doses of patience, through the subtleties of scientific writing

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Finally, we would like to thank our family for supporting us during the compilation of this dissertation

Abstract

Background: Malnutrition among children is still one of the most challenging and complex problem worldwide. Sudan has a rapidly growing population, water scarcity, falling food production and low resilience to climate change. The combined effects lead to food insecurity which greatly influences the children‟s nutritional status

Objectives: aim of the study was to investigate the impact of mothers' knowledge on malnutrition preventive practices amongst children in Ahmed Gasem Hospital Dec 2022

Methods: This cross-sectional hospital-based study was conducted at Ahmed Gasem Hospital - Sudan during period September to December 2022 by using structured questionnaire. The e questionnaire had four sections. The first section from question 1to question 11 comprised sociodemographic information, the second part from question 12 to question 30 comprise questions related to maternal Knowledge toward their malnourished children, the third part from question 31 to question comprised questions 37 related to maternal attitudes toward their malnourished children and the fourth part from question 38 to question 41 comprised questions related to maternal perceptions toward their malnourished children

Results: The present study enrolled 108 mothers of malnourished children. Their ages ranged from 16 and 43 years with the median (interquartile range (IQR)) age being 23 (21 - 30) years. Most the respondents were aged between 22 and 30 years 59 (54.6%), from Khartoum 70 (64.8%), and unemployed 81 (75.0%). The number of children of the respondents ranged from one to nine with a with a median of one (one to two) child(ren). Respondents with one and two children were constituted 40 (37.0%) and 36 (33.3%) of the total respondents. Respondents held positive attitudes towards feeding their children frequently commensurate to the need for food. The study discovered that the majority (92%) of the respondents heard and understood malnutrition. Furthermore, the study found that the majority (88.4%) of the respondents knew that eating balanced diet food prevents malnutrition. The mothers knowledge was found to be 69 (63.9%) has good Knowledge, 25(23.1 %) has Fair Knowledge and 14(13%) has Poor Knowledge .The mothers Attitude was found to be 63 (58%) has positive attitude and 45(42 %) has Negative attitude. The mothers practices was found to be 55 (51%) has good practices and 53(49 %) has bad practices

Conclusions: This research concluded that there was a good knowledge of mothers with positive attitude and acceptable practices regarding malnutrition of children under five year

Key words: Knowledge, Attitude, practices, KAP, Malnourished Children, Ahmed Gasim

المستخلص

الخلفية: لا يزال سوء التغذية بين الأطفال من أكثر المشاكل صعوبة وتعقيدًا مشكلة في جميع أنحاء العالم. يتزايد عدد السكان في السودان بسرعة ، وندرة المياه ، وتناقص الغذاء الإنتاج وانخفاض القدرة على التكيف مع تغير المناخ. تؤدي التأثيرات مجتمعة إلى انعدام الأمن الغذائي مما يؤثر بشكل كبير على الحالة الغذائية للأطفال

الأهداف: الهدف من الدراسة هو التحقق من تأثير معرفة الأمهات على سوء التغذية الممارسات الوقائية للأطفال بمستشفى أحمد قاسم 2022

الطرق: أجريت هذه الدراسة المقطعية المستعرضة في مستشفى أحمد قاسم - السودان خلال الفترة من سبتمبر إلى ديسمبر 2022 باستخدام استبيان منظم. البريد يتكون الاستبيان من أربعة أقسام. يتألف القسم الأول من السؤال 1 إلى السؤال 11 المعلومات الاجتماعية الديموغرافية ، يشتمل الجزء الثاني من السؤال 12 إلى السؤال 30 لأسئلة المتعلقة بمعرفة الأم تجاه أطفالهم الذين يعانون من سوء التغذية ، الجزء الثالث من يتكون السؤال 31 من الأسئلة 37 المتعلقة بمواقف الأمهات تجاههم الأطفال الذين يعانون من سوء التغذية والجزء الرابع من السؤال 38 إلى السؤال 41 يتكون من أسئلة المتعلقة بتصورات الأمهات تجاه أطفالهن الذين يعانون من سوء التغذية

النتائج: شملت الدراسة الحالية 108 أمهات لأطفال يعانون من سوء التغذية. تراوحت أعمارهم من16 و 43 عامًا مع متوسط العمر (المدى بين الشرائح الربعية (23 ((IQR عامًا (21-30) عامًا. معظم تراوحت أعمار المستجيبين بين 22 و 30 سنة 59 (54.6٪) ، الخرطوم 70 (64.8٪) ، والعاطلين عن العمل 81 (75.0٪). وتراوح عدد أبناء المبحوثين من واحد إلى تسعة مع أ بمتوسط طفل (طفل أو طفلان). كان المستطلعون إيجابيين المواقف تجاه إطعام أطفالهم في كثير من الأحيان تتناسب مع الحاجة إلى الغذاء. غالبية المستجيبين (92٪) سمعوا وفهموا سوء التغذية. علاوة على ذلك ، وجدت الدراسة أن غالبية المستجيبين (88.4٪) يعرفون أن الأكل نظام غذائي متوازن يمنع سوء التغذية.وجد ان 63.9% من المهات لديهن معرفه جيده بسوء التغذيه و 13% لديهن معرفه ضعيفه . كما وجد ان 58% من الامهات لديهن مواقف ايجابيه و 42% لديهن مواقف سلبيه كمان ان 51% لديهن ممارسات جيده و49% لديهن ممارسات سيئه

الاستنتاجات: خلص هذا البحث إلى وجود معرفة جيدة بالأمهات المصابات بالإيجابيات المواقف والممارسات المقبولة فيما يتعلق بسوء تغذية الأطفال دون سن الخامسة

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List of Abbreviations

BAPEN	British Association of Parenteral and Enteral Nutrition
BMI	body mass index
KAP	knowledge, attitude, and practices
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey

Chapter - I

Introduction

1. Introduction, Rationale & Objectives

1.1 Background

Good nutrition is the fundamental pillar for the maintenance of positive health [1]. A nation's health depends on the healthy citizen. A healthy adult emerges from a healthy child [2]. Nutrition of the under-five children is of greatest importance because the foundation of our lifetime health, strength, intelligence, and vitality is laid during this period [3]. Malnutrition encompasses both under nutrition and over nutrition (obesity) [4]. However, mostly, it refers to under nutrition resulting from improper feeding practices, impaired utilization of nutrients due to infections and parasites, inadequate food and health security, poor environmental conditions, and lack of proper child care practices [5]. Many countries faces the burden of diseases in which nutritional deficiencies are most common [6]. The prevalence of underweight children in Sudan is among the highest in the world and is nearly double that of Sub-Saharan Africa [7]. Each year approximately 2.3 million deaths among 6–60 months aged children in developing countries are associated with malnutrition, which is about 41% of the total deaths in this age group [8, 9]. Malnutrition is a manmade disease which often starts in the womb and ends in the tomb. It is a global problem especially in developing countries in even in under privileged communities of some developed countries. This is particularly true of developing countries where the population growth is not controlled and resources are poor. The United Nation International Child Emergency Fund in 2005 reported that 150 million children are malnourished worldwide; millions of Indian children are equally deprived of their rights to survival, health, nutrition, education and safe drinking water. It is reported that 63 % of them go to bed hungry, 53% suffer from malnutrition [9].

Healthy eating and physical activity are essential for growth and development in childhood. Hence, to help children develop healthy eating patterns from an early age, it is important that the food and eating patterns to which they are exposed (both at home and outside) are those which promote positive attitudes to good nutrition [10]. Here, knowledge of mothers has an important role in the maintenance of nutritional status of the children and protection of their nutritional needs to ensure sound foundation and secure future of any healthy society [11]. For this mother has to be made more aware about feeding practices of infant and other health-care practices and this will go a long away in reducing the severity of malnutrition [12]. Hence, this study was undertaken with an aim to evaluate knowledge, attitude, and practices (KAP) of mothers regarding nutrition of under-five children and prevention of malnutrition

1.2 Problem statement

Under nutrition remains one of the most common causes of morbidity and mortality among children globally. It causes about 3.5 million deaths, with 35% of the disease burden being in children under five years. Inadequate knowledge on breast feeding, inappropriate practices such as early and delayed introduction of complementary foods, low energy and nutrient density of food offered, feeding thin consistency feeds, small amounts and food restrictions due to cultural beliefs are often greater determinants of malnutrition than even the availability of food [9]. Information on how to feed young children comes from family members, community practices and health workers. Since children are not able to look after themselves, they rely completely on people who are taking care of them, most often the mothers, so their source of nourishment is limited to what their mothers provide [13].

1.3 Justification

Malnutrition among children is still one of the most challenging and complex problem worldwide. Sudan has a rapidly growing population, water scarcity, falling food production and low resilience to climate change. The combined effects lead to food insecurity which greatly influences the children‟s nutritional status.

Malnutrition still remains a challenge in this country with 41% of the children under five years being reported as stunted. In addition, mortality rates secondary to severe acute malnutrition are still high, there is a need to identify knowledge gaps, inappropriate attitudes as well as cultural beliefs and practices that may be contributing to poor nutrition indices in children residing in Sudan. The results from the study will provide useful information which could be used for planning and implementing better interventions informed by local findings. For instance, the identified knowledge gaps will be addressed by designing an appropriate curriculum for educating mothers about nutrition and proper dietary practices so as to prevent malnutrition and thus aid in reducing child mortality.

The study was done in Ahmed Gasim teaching hospital for Children which is located in Khartoum state, Sudan. This hospital is considered as one of the major secondary level referral teaching hospitals for paediatrics healthcare where teaching and training opportunities are offered for medical students, house officers and residents.

There is shortage of literature/data in Sudan on the mother‟s knowledge, attitude and practices towards nutrition when feeding their children.

Lastly, the research findings will be used as a stepping stone for future research in Sudan.

1.4 Objectives

1.4.1 General Objective

To assess maternal Knowledge, Attitude & practices toward their under-five malnourished children regarding etiology, hygienic condition in preparing the child food and nutrition in Ahmed Gasim Hospital

1.4.2 Specific Objectives

-To assess maternal Knowledge toward Definition and Causes of malnutrition

-To assess maternal Attitude toward Definition and Causes of malnutrition

-To assess maternal practices toward Definition and Causes of malnutrition

- To assess maternal healthy dietary habits among malnourished children in Ahmed Gasim Hospital

- To assess the awareness of mother toward preventive practices

-To determine the socio-demographic correlation with maternal Knowledge, attitude and practices (KAP) towards their malnourished children in Ahmed Gasim Hospital

Chapter - II

Literature Review

2. Literature Review

2.1 Malnutrition

The term ‘malnutrition’ has no universally accepted definition. It has been used to describe a deficiency, excess or imbalance of a wide range of nutrients, resulting in a measurable adverse effect on body composition, function and clinical outcome [13]. Although malnourished individuals can be under- or over nourished, ‘malnutrition’ is often used synonymously with ‘under nutrition’, as in this article. Malnutrition is a common, under-recognized and undertreated problem facing patients and clinicians. It is both a cause and consequence of disease and exists in institutional care and the community [3, 5]. Approximately 5% of the UK population are underweight with a body mass index (BMI) below 20 kg/m2, although obese individuals who unintentionally lose weight and subsequently have a BMI within the normal range are also at risk of malnutrition. Other patients become at risk as a result of an acute event (eg small bowel infarction), leaving them unable to meet their metabolic requirements both in the short and longer term. The prevalence of malnutrition increases by at least twofold in the elderly and those with chronic disease, and threefold in individuals living in institutional care [14]. The prevalence of malnutrition in UK hospitals reported over the last 15 years ranges from 13–40%, many patients seeing a further decline in their nutritional status during hospital admission [15]. A large survey conducted by the British Association of Parenteral and Enteral Nutrition (BAPEN) in 2008 found that 28% of inpatients were at risk of malnutrition. The prevalence was higher in specific subpopulations: for example, 34% of all emergency admissions and 52% of admissions from care homes.4 Specific micronutrient deficiencies are also common, especially in the elderly: for example, folate deficiency has been described in 29% of the independent elderly population and 35% of those in institutional care [16].

Most clinical studies use the term 'malnutrition' to refer to undernutrition. However, the use of 'malnutrition' instead of 'undernutrition' makes it impossible to distinguish between undernutrition and overnutrition, a less acknowledged form of malnutrition [17]. Accordingly, a 2019 report by The Lancet Commission suggested expanding the definition of malnutrition to include "all its forms, including obesity, undernutrition, and other dietary risks." The World Health Organization [18] and The Lancet Commission have also identified "[t]he double burden of malnutrition," which occurs from "the coexistence of overnutrition (overweight and obesity) alongside Malnutrition (stunted growth and wasting)."[19]

2.2 Prevalence of Malnutrition

It is estimated that nearly one in three persons globally has at least one form of malnutrition: wasting, stunting, vitamin or mineral deficiency, overweight, obesity, or diet-related non-communicable diseases [20]. Malnutrition is more common in developing countries. Stunting is more prevalent in urban slums than in rural areas. Studies on malnutrition have the population categorised into different groups including infants, under-five children, children, adolescents, pregnant women, adults and the elderly population. The use of different growth references in different studies leads to variances in the Malnutrition prevalence reported in different studies. Some of the growth references used in studies include the National Center for Health Statistics (NCHS) growth charts, WHO reference 2007, Centers for Disease Control and Prevention (CDC) growth charts, National Health and Nutrition Examination Survey (NHANES), WHO reference 1995, Obesity Task Force (IOTF) criteria and Indian Academy of Pediatrics (IAP) growth charts [21].

2.3 Malnutrition In children

The prevalence of Malnutrition is highest among children under five. In 2020, 149 million children under five years old were stunted, 45 million were wasted, and 38.9 million were overweight or obese. The following year, an estimated 45% of deaths in children were linked to Malnutrition [22]. The prevalence of wasting among children under five in South Asia was reported to be 16% moderately or severely wasted. In Asia, India has one of the highest burden of wasting with over 20% wasted children. However, the burden of Malnutrition among under-five children in African countries is much higher. A pooled analysis of the prevalence of chronic Malnutrition among under-five children in East Africa was identified to be 33.3%. This prevalence of Malnutrition among under-five children ranged from 21.9% in Kenya to 53% in Burundi [23]. In Tanzania, the prevalence of stunting, among children under five varied from 41% in lowland and 64.5% in highland areas. Malnutrition by underweight and wasting was 11.5% and 2.5% in lowland and 22.% and 1.4% in the highland areas of Tanzania respectively [24]. In South Sudan, the prevalence of Malnutrition explained by stunting, underweight and wasting in under-five children were 23.8%, 4.8% and 2.3% respectively [25]. Vitamin A deficiency affects one third of children under age 5 around the world, leading to 670,000 deaths and 250,000–500,000 cases of blindness [26].

The UNICEF conceptual framework defines malnutrition and captures the multi-factorial causality of under nutrition[21].

UNICEF classifies the immediate causes of childhood malnutrition as insufficient dietary intake which may result from poor breastfeeding practices, early weaning and delayed introduction of complementary foods. Other factors that influence food intake include health status, food taboos and personal choice related to diet [21]

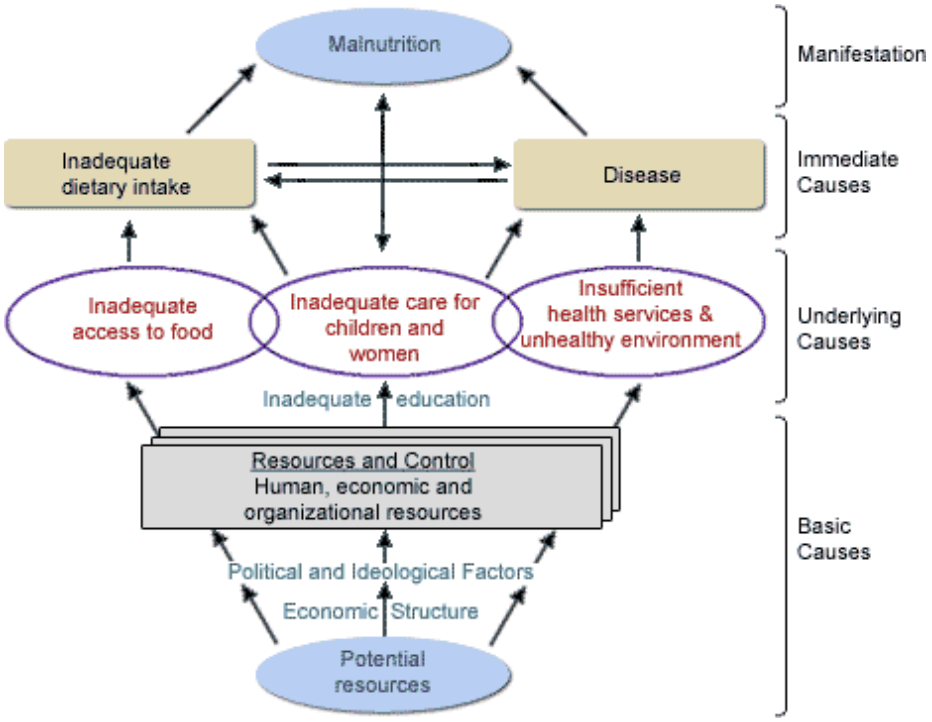

Figure 2.1 UNICEF; Conceptual Framework of the Cause of Malnutrition

UNICEF classifies the immediate causes of childhood malnutrition as insufficient dietary intake which may result from poor breastfeeding practices, early weaning and delayed introduction of complementary foods. Other factors that influence food intake include health status, food taboos and personal choice related to diet[21].

Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food, appropriate maternal and child-care practices.

2.3 Causes of malnutrition

Malnutrition in developed countries is unfortunately still more common in situations of poverty, social isolation and substance misuse. However, most adult malnutrition is associated with disease and may arise

due to: reduced dietary intake, reduced absorption of macro- and/ or micronutrients, increased losses or altered requirements and increased energy expenditure (in specific disease processes) [27].

2.3.1 Dietary intake

Probably the single most important aetiological factor in disease-related malnutrition is reduced dietary intake. This is thought to occur due to reductions in appetite sensation as a result of changes in cytokines, glucocorticoids, insulin and insulin-like growth factors. The problem may be compounded in hospital patients by failure to provide regular nutritious meals in an environment where they are protected from routine clinical activities, and where they are offered help and support with feeding when required [28].

2.3.2 Mal-absorption

For patients with intestinal failure and those undergoing abdominal surgical procedures, mal-absorption represents an independent risk factor for weight loss and malnutrition [29].

2.3.3 Increased losses or altered requirements

In some circumstances, such as enter cutaneous fistulae or burns, patients may have excessive and/or specific nutrient losses; their nutritional requirements are usually very different from normal metabolism [28].

2.3.4 Energy expenditure

It was thought for many years that increased energy expenditure was predominantly responsible for disease related malnutrition. There is now clear evidence that in many disease states total energy expenditure is actually less than in normal health. The basal hyper metabolism of disease is offset by a reduction in physical activity, with studies in intensive care patients demonstrating that energy expenditure is usually below 2,000 kcal/day. The exception is patients with major trauma, head injury or burns where energy expenditure may be considerably higher, although only for a short period of time [30].

2.4 Consequences of malnutrition

Malnutrition affects the function and recovery of every organ system.

2.4.1 Muscle function

Weight loss due to depletion of fat and muscle mass, including organ mass, is often the most obvious sign of malnutrition. Muscle function declines before changes in muscle mass occur, suggesting that altered nutrient intake has an important impact independent of the effects on muscle mass. Similarly, improvements in muscle function with nutrition support occur more rapidly than can be accounted for by replacement of muscle mass alone [27, 30]. Down regulation of energy dependent cellular membrane pumping, or reductive adaptation, is one explanation for these findings [27]. This may occur following only a short period of starvation. If, however, dietary intake is insufficient to meet requirements over a more prolonged period of time the body draws on functional reserves in tissues such as muscle, adipose tissue and bone leading to changes in body composition [29]. With time, there are direct consequences for tissue function, leading to loss of functional capacity and a brittle, but stable, metabolic state. Rapid de-compensation occurs with insults such as infection and trauma. Importantly, unbalanced or sudden excessive increases in energy intake also put malnourished patients at risk of de compensation and re-feeding syndrome [28].

2.4.2 Cardio-respiratory function

Reduction in cardiac muscle mass is recognized in malnourished individuals. The resulting decrease in cardiac output has a corresponding impact on renal function by reducing renal perfusion and glomerular filtration rate. Micronutrient and electrolyte deficiencies (eg thiamine) may also affect cardiac function, particularly during refeeding. Poor diaphragmatic and respiratory muscle function reduces cough pressure and expectoration of secretions, delaying recovery from respiratory tract infections [27, 28].

2.4.3 Gastrointestinal function

Adequate nutrition is important for preserving GI function: chronic malnutrition results in changes in pancreatic exocrine function, intestinal blood flow, villous architecture and intestinal permeability. The colon loses its ability to reabsorb water and electrolytes, and secretion of ions and fluid occurs in the small and large bowel. This may result in diarrhea, which is associated with a high mortality rate in severely malnourished patients [27].

2.4.4 Immunity and wound healing

Immune function is also affected, increasing the risk of infection due to impaired cell mediated immunity and cytokine, complement and phagocyte function. Delayed wound healing is also well described in malnourished surgical patients [29, 30].

2.4.5 Psychosocial effects

In addition to these physical consequences, malnutrition also results in psychosocial effects such as apathy, depression, anxiety and self-neglect [30].

Table 2.1: Malnutrition and its consequences.

Effects on health	Effects on social and economic development
Malnutrition is the basis of physical and cognitive stunting that makes children vulnerable to various diseases and infections.	Prevent people from reaching their full potential
	Children with malnutrition show poor performance in school thus limiting their future and their opportunities.
	Adults with malnutrition are less productive, and cannot provide a health care for their families.
The deficiency in micronutrients can lead to severe illness and damage to physical health and impairments such as anaemia, blindness, mental disability and can cause neural tube defects in-utero	Women and mothers with malnutrition are likely to have underweight babies at high risk of cognitive and physical impairment
	Continued cycle of poverty and economic stagnation

2.6 Factors that influence malnutrition amongst children (Socio economic factors)

2.6.1 Poverty

Socioeconomic factors play a big role in the issue of malnutrition amongst children in South Africa. Lack of financial resources makes it difficult for many families to afford healthy food. Foods such as vegetables and fruits are significantly more expensive than foods that are high in carbohydrates, fats and sugar. These foods do not contain enough nutrients, but since they are more affordable, many families buy them anyway to be able to provide a sufficient quantity of food for their family and to prevent hunger [31]. High energy foods such as maze meal, white rice and white bread also keeps the individuals full for a longer time than after eating vegetables and fruits. Because of these factors, it is hard for poor families to find the economical possibility or motivation to buy healthier foods since they cannot afford it, and will be hungrier if they switch from consuming high energy foods to vegetables and fruits [32].

2.6.2 Food security

Another factor driving malnutrition is food security. Many poor people in cannot prepare and consume fresh food because they do not have access to electricity or running water. Access to functioning sanitation facilities is also a major problem in big parts of South Africa. Due to the lack of clean water and sanitation, many children suffer from diseases such as diarrhoea, which is strongly connected to malnutrition and increased mortality. The lack of food security is most severe in rural areas, where families also do not have access to or the economy to buy healthy food that is sufficient, safe and nutritious enough to meet dietary needs [33].

2.6.3 Access to healthcare

The lack of financial resources is also a determining factor for parents to be able to provide good medical care for their children. Many families are in need of proper support and education on how to provide the right nutritional support for their children. However, a visit to a private clinic is often too expensive for many families. The families can then seek help at a public clinic, but waiting times are often long. The opportunity to give proper education is also often limited due to undermanned staff. Since the staff is too few, it is problematic for them to have enough time to provide education to the patients. Because of this, many families choose to not seek help at all. Another problem regarding access to healthcare is large distances within the country. Many people live in rural areas that are far away from a hospital or other care facilities. Therefore, it takes long and exhausting journeys to reach medical care, which results in that many people in these areas not receiving any medical care when they get sick [34].

2.6.4 Culture

In some high-income communities, breastfeeding is defective but not due to restricted economical resources or physical problems with breastfeeding. In these communities, mothers choose not to breastfeed since it is considered unfashionable. The mentality around breastfeeding is orbiting around a wish to keep their breasts attractive and avoiding pain in the breasts associated with breastfeeding. It is also a matter of peer-pressure in these communities. When most women bottle-feed their babies, increasingly more mothers start to question why they should breastfeed when others bottle-feed [34].

2.7 Child related factors of malnutrition of children

There are a number of demographic variables that researchers have found important in influencing malnutrition in under-fives. This study however focused on a few of them that included sex of child, age of child, birth order, birth interval and mother's age at birth.

2.7.1 Sex of child

From the reviewed literature, there seems to be a consensus that malnutrition among children below five years is greater among boys as compared to the girls. The cause of this discrepancy is not well established in the literature. However, it is believed that boys are more influenced by environmental stress than the girls [35]. According to a study done in Kwara state Nigeria, (Babatunde; 2011) reported that there was a significant relationship between sex of a child and malnutrition. Male children were more likely to be malnourished than their female counterparts. This is probably due to increased attention paid to female children unlike the male children [36]. A study (Olwedo et al; 2008) on the factors associated with malnutrition in internally displaced persons' camps of Northern Uganda indicated that a male child was nearly two times more likely to suffer from acute malnutrition compared to a female child. This situation could be due to the fact that boys are rare at home given the fact that they tend to be active running around in the neighborhood as compared to female children who in most cases eat whatever small feeds that their mothers got since they are always with them at home [37].

2.7.2 Age of child

Recent studies have found out that younger children are less likely to be malnourished than the older children. This is due to the fact that weaning and less breast milk make them more vulnerable malnutrition. However, after weaning, the children begin to get adequate nutrition when they get used to complementary feeding [38]. It is important to note that specific ages, children's nutritional status is sensitive to feeding, weaning practices, care, and exposure to infection. A cumulative indicator of growth retardation (height-for-age) in children is positively associated with age. A study conducted by Nguyen and Kam in Vietnam found out that the risk of malnutrition increases with age of a child. Children in the youngest age group 0-11 months had significantly lower risk of being stunted, underweight and wasted than children in the older age groups [39].

The low risk to malnutrition may be as a result of protective effect of breastfeeding since almost all children are breastfed throughout the first year of life. Higher rates of malnutrition after the 12 months are linked to inappropriate food supplementation during the weaning period. According to (UBOS and Macro International Inc; 2007), malnutrition increases with the age of the child through the first three years of life before declining in the fourth and fifth year [40]. The increase is especially rapid during the first two years of life, as evidenced in the rise from 13 percent among children aged 6-8 months to 45 percent among children aged 18-23 months. It is expected that parents give less attention to older children when they give birth to a new child who needs much attention and care. Similar findings have been reported in different countries for instance in Kwara state of Nigeria [36].

2.7.3 Birth Order

Research findings indicate that malnutrition is rare among under-five children of birth order 2-3 and that higher birth order (5+) is positively associated with child malnutrition [41]. In a study carried out among 6939 children below five years in Bangladesh, the prevalence of stunting increased with birth order hence most of the children who were of birth order more than two had greater chances of stunting and wasting. Worthy to note is that few studies according to the literature search have been conducted on the subject of child birth order and malnutrition among under-five children. The Bangladesh Demographic Health Survey (BDHS) 2011 report showed that unwanted birth and child mortality increases with higher birth order [42].

2.7.4 Birth Interval

In another study conducted in Bangladesh, children within the first birth interval were 1.66 times more likely to be stunted and children whose preceding birth interval was less than two years were 1.32 times significantly more likely to be stunted as compared to children of a preceding birth interval 24 months or above. Similar results were observed for underweight children. The study indicated that preceding birth intervals and child stunting were statistically significant ($p<0.05$). Preceding birth intervals of 18-35 months had a marginally positive significance on stunting whereas the interval of more than 48 months shows a negative relationship on stunting [43]. A meta-analysis found out that both short birth intervals (6-17 months) and long birth intervals (59 months and above) were associated with significantly greater risk for adverse perinatal outcomes such as preterm birth, low birth weight, and small size for gestational age. According to UBOS and Macro International Inc (2007), malnutrition is highest if the birth interval is less than 24 months (41 percent) since it is an important indicator of the nutritional status of children [40].

2.8 Maternal related factors of malnutrition of children

A lot has been written about the socio-economic determinants of malnutrition among children under-five children by several researchers in both developed and developing countries. The study focused on maternal education, maternal age at the time of birth, marital status and maternal occupation.

2.8.1 Maternal Education

Mother's education level affects child's nutrition through her choices and health seeking skills related to nutrition, hygiene, preventive care and disease treatment. Mother's responsibility to care for herself during pregnancy and her child through the most vulnerable stages of its life significantly affects malnutrition of children under five years. Several studies have found out that mothers' education is associated with good nutrition practices and particularly child nutrition of children under five years [36, 37, 38]. The above studies pointed out the fact that most women with low education spend more time in gardens and feed their children on less nutritious foods. Women who spend more time in gardening get limited time to attend to their children and prepare for them nutritious meals unlike their educated counterparts who normally focus on good child nutrition practices even when they are absent from home most of the time. Education helps mothers gain additional knowledge about the adequate intake of food for their children in terms of correct quantity, quality and frequency. It also determines her income and this helps her access proper nutrition for the child as well as health services. There is a negative association between the mother's education and malnutrition of children under- five years however [44]. The higher the level of mothers' education, the lower the percentage of under-five children classified as undernourished. According to the study, malnutrition was most prevalent among children whose mothers attended primary school. It is however important to note that the decline in the levels of malnutrition with increasing maternal education is not always gradual. In some countries, malnutrition levels are fairly similar among children whose mothers attended primary or secondary school while elsewhere there is a greater similarity with children whose mothers attended primary school or had no formal schooling. With increasing level of mother's education, the proportion of children who are malnourished goes down as found out in the Uganda Demographic and Healthy Survey of 2006 [40].

In a similar study in Bangladesh, children of mothers with no education and primary education were 28% and 33% respectively more stunted than children of mothers with secondary or higher education. Wasted and underweight children also showed similar results. Children whose mother had no education or had

primary education were more times significantly stunted and underweight than children whose mothers had secondary or higher level. However for wasting, children whose mothers had primary or secondary education had 0.87 times lower odds of wasting than those of mothers with higher education [43]. More to note is that mother's education is associated with more efficient management of limited household resources, greater utilization of available health care services, better health promoting behaviors, lower fertility as well as child centred caring practises. All this consequently results into a reduction in malnutrition among under-five children. Indeed from the above study, children whose mothers had primary or no education were less likely to be stunted, underweight or even wasted perhaps because most of these mothers were unemployed and were able to stay home and care for their children [39].

2.8.2 Marital Status

There's a growing awareness of the importance of both parents participating in child upbringing and the involvement of men in the feeding of young children [45]. However, the area of child care and nutrition has been characterized by limited inclusion of men in the majority of African communities. On the study about mothers' marital status and under-five child nutrition, findings in Ethiopia revealed that child's malnutrition is significantly associated with marital status. It was found out that under-five child malnutrition is higher among unmarried rural and divorced/separated women compared to married ones [46].

2.8.3 Maternal Occupation

Previous studies found out that mother's occupation is one of the determinants of under five malnutrition in most developing countries. A study in Vietnam revealed that children from mothers who were labourers or farmers and had a greater prevalence of stunting, underweight and wasting than those from mothers who worked in office or were housewives [39]. This is because working mothers rarely get time to take care of their children. They also leave their children at home with other siblings who may neglect feeding them following the right frequency and this sometimes worsens the problem of malnutrition. It is also common for mothers to fail to provide complementary feeds including protein foods since most of them cannot afford them [37]. Mother's occupation is one of the indicators for access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities which are prime determinants of child nutritional status [45]. It is little wonder therefore that malnutrition was found to

decrease with mother's occupation although the pattern is not uniform according to UBOS and Macro International Inc., 2007 study that conducted the Uganda Demographic and Healthy Survey in 2006 [40]. According to a review of Demographic and Health Surveys in selected African countries, malnutrition is more prevalent among children whose mothers did not work for instance according to DHS 1986-89, Burundi had 48% of stunted growth among children from non-working mothers while Zimbabwe had 31.0% of her children stunted among nonworking mothers while 27.5% were among working mothers. Wasting and underweight were also more common among the children of non-working mothers [44]. The above findings contradict study results where working mothers particularly crop cultivators had more chances of having malnourished children than their counterparts particularly pastoralists because they spent the bigger part of the day at home which helped them feed their children.

2.8.4 Maternal age at birth

Mothers' age at birth has been associated with malnutrition among children below five years. A case in point was found out in Bangladesh where children whose mothers were less than 20 years at the time of birth were 1.22 times more likely to be stunted, wasted and underweight compared to children whose mothers were 20 years and above at the time of birth [43]. In the Ugandan settings identified some common risk factors for protein energy malnutrition. The severely malnourished infants mostly from young mothers had low weight at birth with less access to breast feeding which is essential for the infants' protein intake. Thirty four percent (34%) of children received supplementary food by three months and some mothers stopped breast feeding earlier [47]. A number of studies have reported that mothers' age at birth is one of the most important determinants of malnutrition among children below five years. It has been suggested that the risk is greater in younger mothers particularly those below 24 years because they are not ready to take care of the child including providing all the necessary attention required for the baby. Similarly, under-five malnutrition is higher also among children whose mothers give birth when they are older especially after 35 years. This is attributed to the fact that giving birth at an older age is associated with a higher likelihood of giving birth to babies with a low birth weight [38].

2.9 Malnutrition prevention

Most children are at greatest risk of malnutrition from the age of six months when they are growing fast and breast milk alone cannot cover nutritional needs until they are 2-3 years old when growth slows and

they can feed themselves. Families and health workers can find out if children are well nourished or malnourished by weighing them regularly and plotting their weights on growth charts [48]. A child may: gain weight at the healthy rate, which means the child is almost certainly eating well and is healthy; gain weight too slowly or not gain any weight, which signals that something is wrong. The child may be sick and/or not eating enough; lose weight, which is a very dangerous sign [49]. The child may not be eating enough and almost certainly ill; gaining weight faster than the healthy rate, which will probably mean the child is catching up on the weight lost during an illness but can also mean that the child has a health problem that could lead to obesity. Care-givers and health workers need to pay attention to these changes in a child. Health workers need to work with the family of a malnourished child to find out why the child is not growing well and discuss the feeding pattern, i.e. amount, variety and frequency of meals, appetite, behaviour and illnesses [48]. They should examine the child for infections or other medical conditions in order to find the underlying causes such as family food shortages; poor feeding practices; child receives insufficient care [32]. The intervention plan for the child should be worked on together with the caregivers. In order for the child's nutritional status to improve, a family will need to feed the child better.

This may mean increasing breastfeeding, improving complementary feeding, feeding more frequently and/or giving more attention during meals. Family beliefs on child feeding and blocks to better feeding e.g. lack of resources, such as food, cash, time or cooking facilities should be discussed and addressed. Then the decisions on improved feeding practices should be determined based on what the family is able and willing to adopt [48]. The child should be taken for treatment if sick and caregivers should be taught how to prevent childhood infections in the future. Health workers should monitor undernourished children's weights closely. If a family is unable to provide a healthy, balanced diet for a child, they may need to be assisted with provision of food by enrolling the child in a supplementary feeding programme for a while. Sometimes a family should be referred to a social worker, agricultural field worker or other community service to help deal with underlying reasons for poor nutrition. Hospital admission is required for severe cases of malnutrition until the child is stable enough to be managed as an outpatient [49].

2.10 Previous studies

2.10.1 Knowledge of mothers regarding malnutrition

A study conducted by Cumber, Ankraleh, and Monju, (2016) which assessed the knowledge of mothers on malnutrition found that majority of (22) mothers (73%) said malnutrition during child hood is when the

child has a large head and swollen stomach, weight loss and not having proper nutritional requirements for the body. Moreover, Cumber, Ankraleh, and Monju, (2016) also discovered that about 15 (50%) mothers who were participants in the study said that a child's malnutrition is as a result of poor hygienic conditions whilst preparing the child's food, poverty, unsafe water diseases and infections. On the definitive signs and symptoms of malnutrition, 12(40%) mothers reported that signs and symptoms of malnutrition in children include; skin that may become inelastic and a longer time for recovery from infection and illness [50].

Bodzewan (2015) also conducted a study that assessed mothers' knowledge on malnutrition and he discovered that 72 (60%) mothers who were respondents in his study had good knowledge on what malnutrition is. These mothers reported that malnutrition results from inadequate intake of nutrients that the body needs to maintain healthy tissues and organ functions ;40% had no knowledge of malnutrition and for this reason, some women do not practice preventive measures against malnutrition because they do not know its importance [51].

2.10.2 Mothers' malnutrition preventive practices for children

In the study conducted by Bodzewan (2015), he explored mothers preventive practices on malnutrition among their children and it was discovered that most mothers [56 (48.28%)] prevented malnutrition by feeding the child with a balanced diet. Moreover, in the same study mothers also indicated that they practice exclusive breastfeeding [51]. In another study by Reiher and Mohammadnezhad (2017), it was discovered that majority of mothers (80.9%) who were respondents in the study stated that they take their children for immunisation as part of malnutrition prevention [52].

A study conducted by Manohar, Reddy, Vyshnavi, and Sruthi (2018) assessed knowledge, attitude and practice of mothers with severe acute malnutrition children regarding child feeding. The study found that 60% of mothers wash their hands before feeding their children, 29.16% clean their breast before and after feeding their child, cut their child's nails regularly, bath daily, and 88% wash their hands after using the toilet or after changing their child's diaper [53].

2.10.3 Attitudes of mothers towards malnutrition and its preventive practices among children

Based on the study conducted by Edith and Priya (2016) mothers of under-five children who were respondents in their study were found to have moderately favourable attitude [54]. Another study by Berra (2013) showed that majority (72%) of mothers had positive attitude towards colostrum and 55.4% of the mothers practiced starting complementary food from six months of age [55].

Chapter - III

Materials & Methods

3. Materials & Methods

3.1 Study design

This study was a descriptive cross sectional-hospital based study

3.2 Study area

The study was done in Ahmed Gasim teaching hospital for Children which is located in Khartoum state, Sudan. This hospital is considered as one of the major secondary level referral teaching hospitals for paediatrics healthcare where teaching and training opportunities are offered for medical students, house officers and residents.

The hospital provides services for the general population from surrounding residential areas (Khartoum North locality), Khartoum state and all over the country. Ahmed Gasim hospital consists of an emergency service building which is composed of an emergency room, a minor theatre and three short stay wards with a capacity of 50 beds. Ahmed Gasim Hospital has an intensive care unit composed of 7 beds and high dependency care unit of 8 beds capacity. There are 7 long stay wards with total capacity of 110 beds

The hospital also provides care for children through a specialized clinics on cardiology, rheumatology, immunology, gastroenterology, diabetes, endocrinology, pulmonology, tuberculosis, and nutrition.

3.3 Study duration

Study duration from first September to 24 December 2022.

3.4 Study population

The study population was include mothers with children less than five years with malnutrition in Ahmed Gasim Hospital‟s inpatient and outpatient department

3.5 Sampling techniques

Consecutive sampling was used to enrolled participants, until the required sample size was attained.

3.6 Sample size

Sample size was calculated using the formula as per Fisher et al

$$n = \frac{z^2(p(1-p))}{}$$

d^2

Where:

n-Sample size

z- Standard normal deviate for 95% confidence interval (1.962)

p- Estimated proportion of knowledgeable mothers regarding malnutrition (92.4% as reported in study done by Wondu in Ethiopia)

d=precision (0.05)Thus, n=108

3.7 Inclusion criteria

- Mothers with malnourished children less than five years
- Visiting outpatient department or admitted in Ahmed Gasim Hospital.
- Mothers who was given consent to take part in the study.

3.8 Exclusion criteria

- Mothers who declined to sign the consent.
- Mothers with children with other co-morbidities-HIV, cardiac, malignancies, chronic renal disease and chronic diseases.

3.9 Study variables

The independent variables in this study included socio-demographic characteristics such as age, education level, marital status, religion, number of children in the family and employment.

The dependent variable in this study included maternal Knowledge, Attitude & practices toward their malnourished children

3.10 Screening and recruitment

Screening of children was done in the outpatient and inpatient departments daily during the study period. Anthropometric indices of the children were determined after taking the appropriate measurements (height, weight, MUAC, age).The mothers of children who found to be malnourished (visible wasting, bilateral edema , MUAC less than 12.5cm) was enrolled into the study according to WHO classification. Both written and verbal consent was obtained from the mothers and consenting mothers were interviewed.

3.11 Study instrumentation

A predesigned and pretested questionnaire was used for this study. The e questionnaire had four sections. The first section from question 1to question 11 comprised sociodemographic information, the second part from question 12 to question 30 comprise questions related to maternal Knowledge toward their malnourished children, the third part from question 31 to question comprised questions 37 related to maternal attitudes toward their malnourished children and the fourth part from question 38 to question 41 comprised questions related to maternal perceptions toward their malnourished children.

- Knowledge was assessed by giving 1 to correct answer and 0 to the wrong answer. The scale measured knowledge from maximum 18 to minimum 0. Scores were taken as describe in table 3.1
- Attitude was assessed by giving 2 to positive and 1 to negative attitude. The scale classified attitude as describe in table 3.2
- Practice was assessed by giving 2 to positive and 1 to negative. The scale classified practice as describe in table 3.3

Table 3.1 score of knowledge regarding malnutrition

Level of Knowledge	Score
Poor Knowledge	1-6
Fair Knowledge	7-12
Good Knowledge	13-18

Table 3.2 Level of Attitude regarding malnutrition

Level of Attitude	Score
Negative attitude	1-7
Positive attitude	8-14

Table 3.3 Level of practice regarding malnutrition

Level of practice	Score
Bad practice	1-4
good practice	5-8

3.12 Data analysis

The collected data was cleaned, coded, entered into Excel sheet, and exported to SPSS version 23 for analysis. Descriptive statistics was done to summarize the dependent and independent variables. Chi-square test was employed to analyze the association between population characteristics and variables. Furthermore, the Spearman rank correlation coefficient was utilized to evaluate the relationship between variables with P-value<0.05 considered as significant.

3.13 Ethical Considerations

Objectives and goals were explained at the beginning of the questionnaire to all participating mothers, and their enrolment was after they consent to participate in the study. Research ethics includes the approval sheet, anonymity, confidentiality, and ethical eligibility. Ethical feasibility in this study comes from the Ethics Committee of faculty of medicine, Napata College -Then the permission was taken from director manger of Ahmed Gasim hospital

Chapter - IV

Results

4. Results

4.1 Demographic characteristics of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022

4.1.1 Characteristics of enrolled mothers' with malnourished children at Ahmed Gasim Hospital December 2022 (n=108)

Table 4.1 Background information of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108)

Characteristic	Number (n=108)	%
Mother's age (years)		
<21	28	25.9
22 to 30	59	54.6
31 to 40	16	14.8
>40	5	4.7
Residence		
Khartoum	70	64.8
Omdurman	18	16.7
Bahri	8	7.4
Other	12	11.1
Employment		
Employed (formal)	9	8.3
Employed (self)	18	16.7
Unemployed	81	75.0
No. of children in the family		
One	41	38.0
Two	35	32.4
Three	13	12.0
≥4	19	17.6
No. of living children		
One	40	37.0
Two	36	33.3
Three	12	11.1
≥4	20	18.5

The present study enrolled 108 mothers of malnourished children. Table 4.1shows the background characteristics of the mother's with malnourished children who participated in the study. Their ages ranged from 16 and 43 years with the median (interquartile range (IQR)) age being 23 (21 - 30) years. Most the

respondents were aged between 22 and 30 years 59 (54.6%), from Khartoum 70 (64.8%), and unemployed 81 (75.0%). The number of children of the respondents ranged from one to nine with a with a median of one (one to two) child(ren). Respondents with one and two children were constituted 40 (37.0%) and 36 (33.3%) of the total respondents.

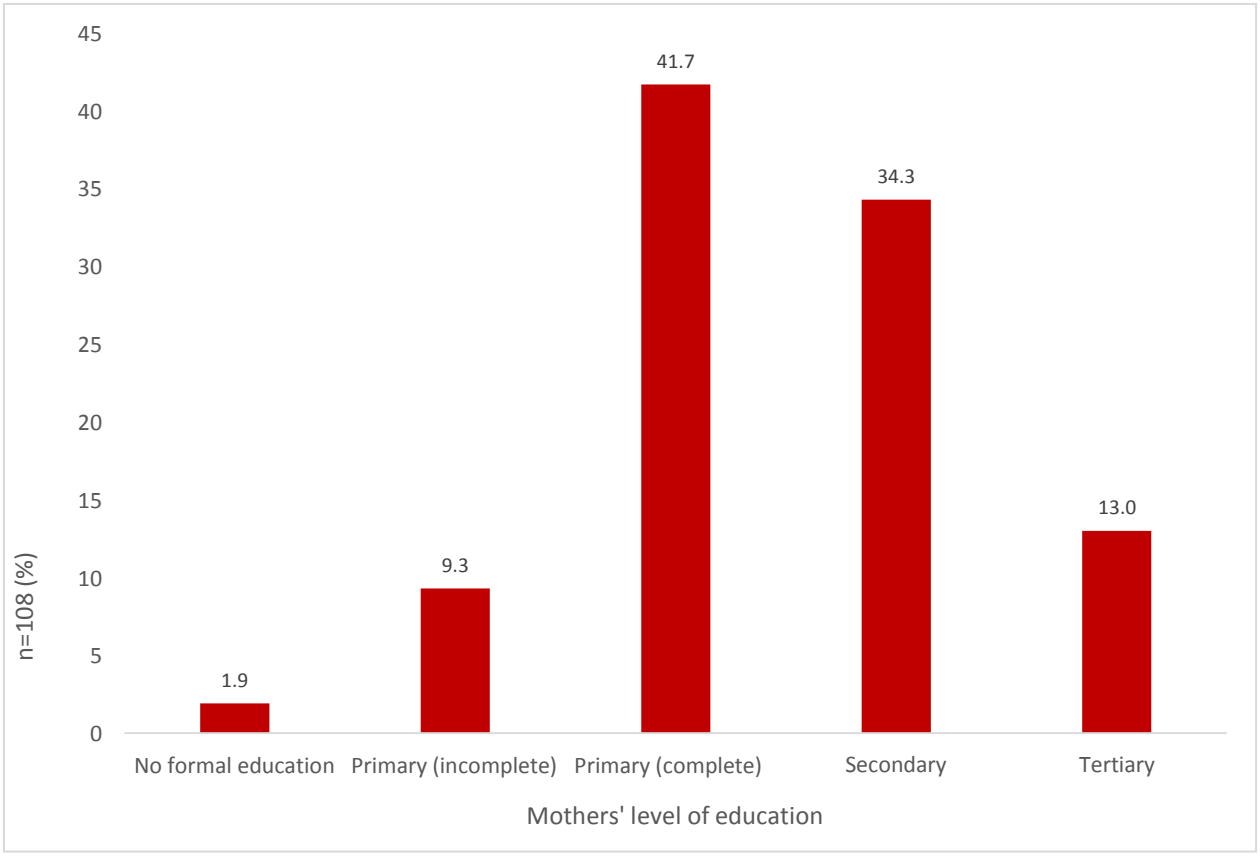

Figure 4.1 Education levels of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108)

Assessment of the highest level of education attained by the respondents showed that 10 (9.3%) had incomplete primary education, 45(41.7%) had complete primary school while 37 (34.3%) had attained secondary school education (Figure 4.1)

4.1.2 Characteristics of enrolled Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108)

Table 4.2 Characteristics Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108) (n=108)

Characteristic	Number (n=108)	%
Gender		
Male	46	42.6
Female	62	57.4
Age		
<2 years	57	52.7
2-3 years	34	31.5
>3 years	17	15.7

Out of the 108 children recruited into the study, 62(57.4%) were females. The median (inter-quartile range) age of the children was less than 2 years (Table 4.2). Further,14 (13%) of child were attend to nursery Figure 4.2

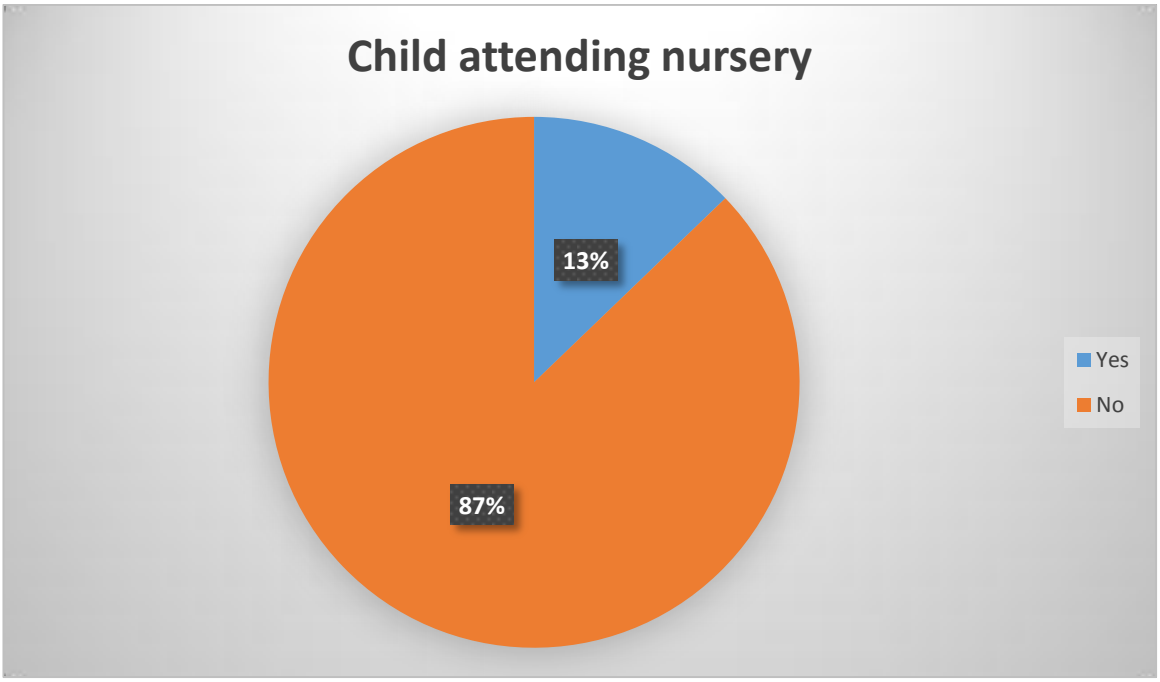

Figure 4.2 Child attending nursery

4.2 Nutritional status of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108)

Table 4.3. Classification of malnutrition among Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (n=108)

Type	Number (n=108)	%
Severe AM* (WHZ§< - 3)	45	41.7
Moderate AM (WHZ<-2 to ≥ -3)	63	58.3

**Acute Malnutrition; §weight-for-height Z-scores*

All the children recruited in the study were diagnosed with malnutrition. Further analysis revealed that 45(41.7%) had severe acute malnutrition (SAM) identified by severe wasting (weight- for-height Z-scores (WHZ) < -3). Additionally, moderate acute malnutrition (MAM) identified by moderate wasting (WHZ< -2 z-score and ≥ -3 z-score) was prevalent in 63(58.3%) of the participating children (Table 4.3).

4.2 Knowledge

Table 4.4 Knowledge level of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 (N=108)

ITEM	GOOD KNOWLEDGE	FAIR KNOWLEDGE	POOR KNOWLEDGE
NUMBER N=108 (%)	69 (63.9%)	25 (23.1%)	14 (13%)
TOTAL SCORING	1189	235	59
MEAN ± SD	17.2 ±0.51	9.4 ± 0.45	4.2 ± 0.878

The mothers knowledge was found to be 69 (63.9%) has good Knowledge, 25(23.1 %) has Fair Knowledge and 14(13%) has Poor Knowledge (Table 4.4).

4.2.1 Have you ever heard of malnutrition?

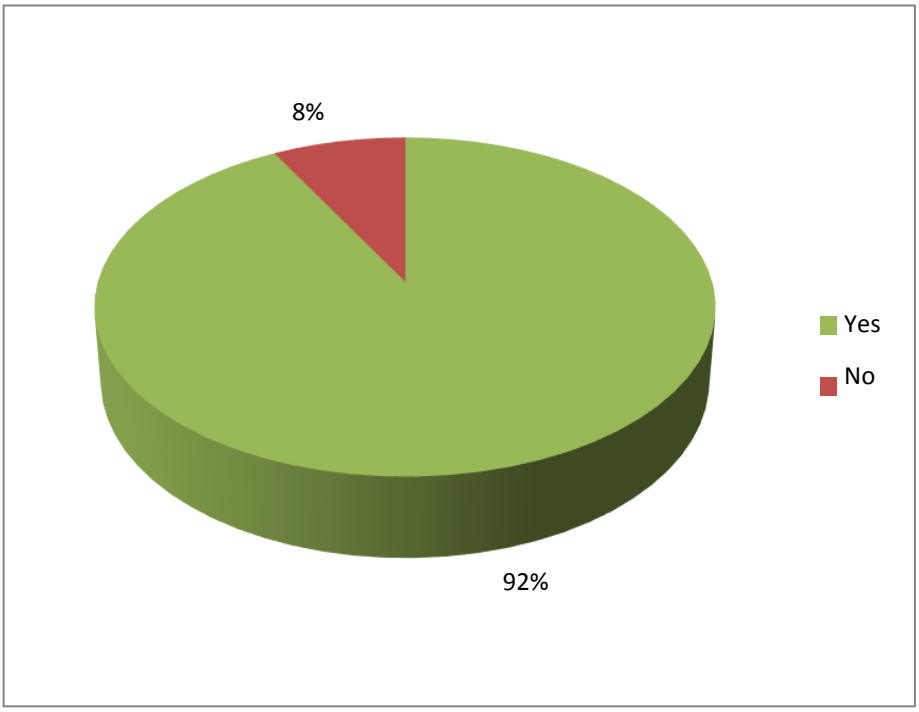

Figure 4.3: Distribution of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 who heard and those who never heard about

malnutrition (N=108).

Figure 4.3 indicates that 99(92%) respondents heard about malnutrition while 9 (8%) never heard about it.

4.2.2 Where did you hear about malnutrition?

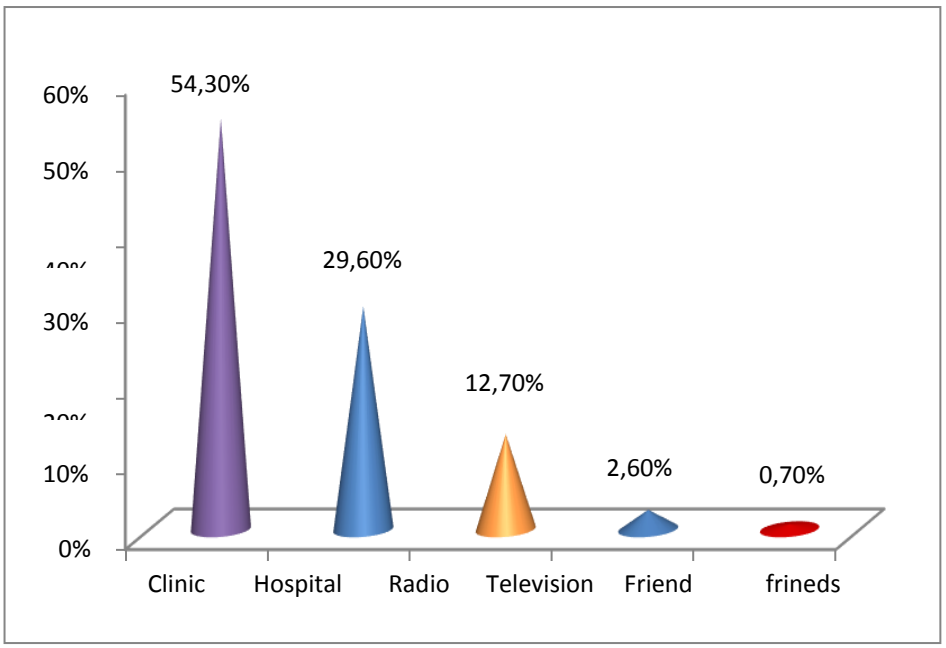

Figure 4.4: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 sources of malnutrition knowledge (N=108)

This question was designed specifically for respondents who heard about malnutrition: Figure 4.4 shows that 58 (54%) respondents heard about malnutrition from the clinic, followed by 32(29.6%) respondents who heard from the hospital. Moreover, radio was the third common source of malnutrition knowledge as reported by 14 (12.7%) followed by television with 3(2.6%) respondents. Friends were the least source of knowledge with 1(0.7%) respondents

4.2.3 Malnutrition involves a dietary deficiency

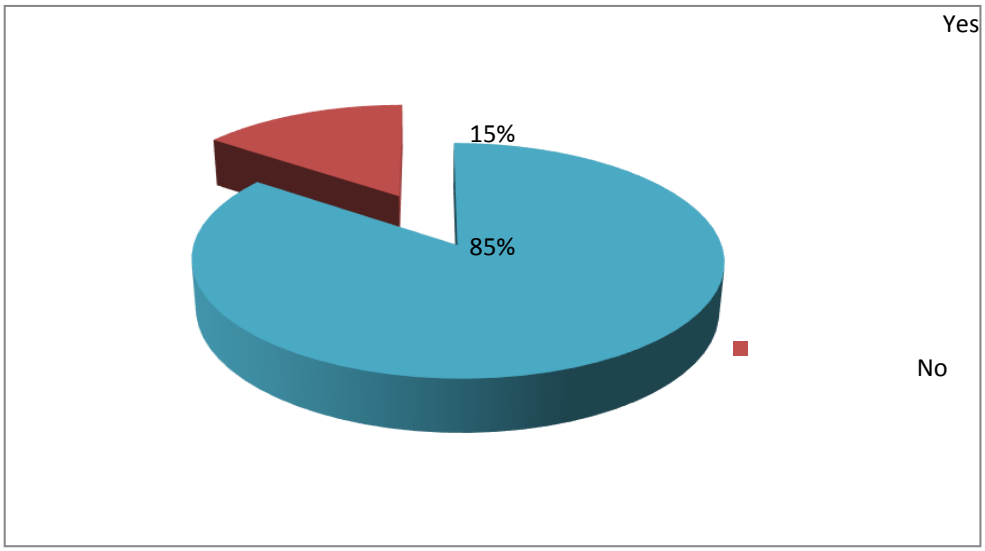

Figure 4.5: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 on whether malnutrition involves dietary deficiency (N=108)

Figure 4.5 shows that 92(85%) respondents agreed that malnutrition involves dietary deficiency while 16(15%) disagreed with the statement.

4.2.4 Underweight, swelling of face and legs are symptoms of malnutrition

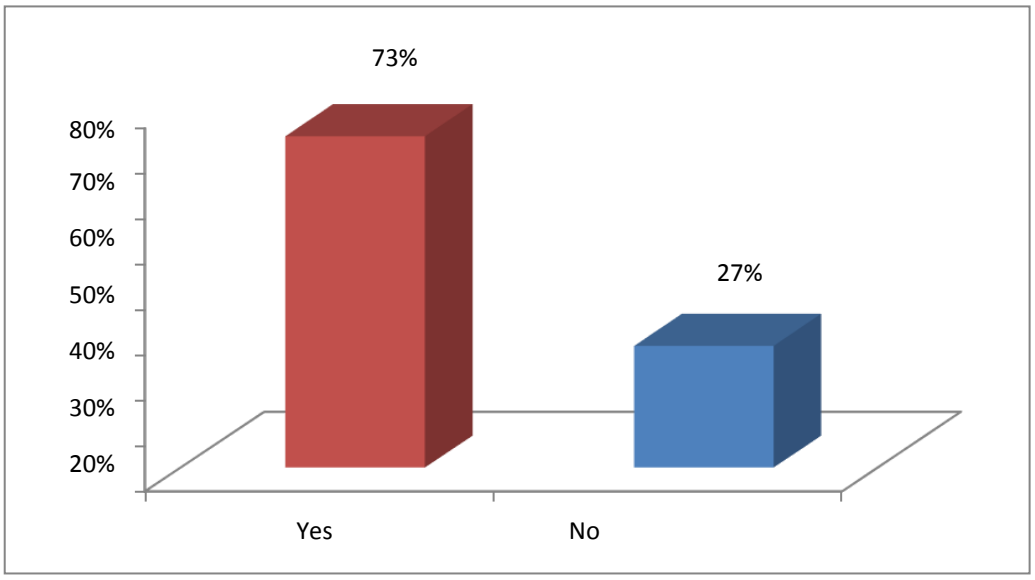

Figure 4.6: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 knowledge about symptoms of malnutrition (N=108)

Figure 4.6 show that 79(73%) respondents agreed that Underweight, swelling of face and legs are symptoms of malnutrition, while 29(27%) disagreed with the statement.

4.2.5 What cause Malnutrition?

Table 4.5: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 responses on causes malnutrition (N=108)

Possible causes	*(f)*	(%)
Diarrhea	22	20.8
Lack of nutrients in the BODY	68	62.8
Cholera	14	13.0
HIV/AIDS	4	3.4
Total	108	100.0

Table 4.5 indicates that 68(62.8%) respondents reported lack of nutrients in the body as the cause of malnutrition, 4(3.4%) while reported HIV/AIDS as the cause. Moreover, 14 (13%) respondents reported cholera as the cause of malnutrition while 22(20.8%) reported diarrhea as the cause.

4.2.6 Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 Knowledge on Prevention of Malnutrition in Their Children?

Table 4.6: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 responses on Prevention of Malnutrition in Their Children (N=108)

Questions	Answer	*(f)*	(%)
Breastfeeding should be initiated within half an hour of delivery:	Yes	101	**93.7%**
	No	7	**6.3%**
An infant should exclusively breastfeed for the first 6 months	Yes	73	68%
	No	35	32%
An infant should start complementary food at 6 month	Yes	40	**37.5%**
	No	68	**62.5%**
Age of weaning :	<1 month	13	**12%**
	1-18 month	56	**52%**
	> 18 month	39	**36%**
Weaning:	Sudden	14	**13%**
	gradually	94	**87%**
Adequate breastfeeding, nutritious food, and regular deworming will prevent malnutrition in children:	Yes	79	**73%**
	No	29	**27%**
Cow milk is more convenient	Yes	52	**48%**
	No	56	**52%**
Goat milk is more convenient:	Yes	46	**43%**
	No	62	**57%**
Hand washing with soap after visiting toilets:	Always	14	**13%**
	sometimes	83	**77%**
	Never	11	**10%**
Wash child's hands with soap:	Always	13	**12%**
	sometimes	72	**67%**
	wash only with water	23	**21%**

Source of drinking water:	protected	23	**21%**
	unprotected	85	**79%**
Vegetables are washed properly before cooking:	Yes	92	**85%**
	No	16	**15%**
Immunization of children is the best way to protect the child against infectious diseases:	Yes	95	**88%**
	No	**13**	**12%**

Table 4.6 indicates that More than half 73(68.7%) of mothers correctly answered about the foods essential for children growth, 101(93.7%) and 45(37.5%) reported correct answers about the time of initiating breastfeed and supplementary feed, respectively. There were 59 (55%) mothers who correctly answered the question asked if the severe malnutrition of children needed hospitalization. Majority of mothers who were reported to provide correct answers about the complications of malnutrition, prevention of malnutrition, and protection of the child, respectively.

4.2.7 Breathing difficulties and increased risk of chest infection and death are complications of malnutrition

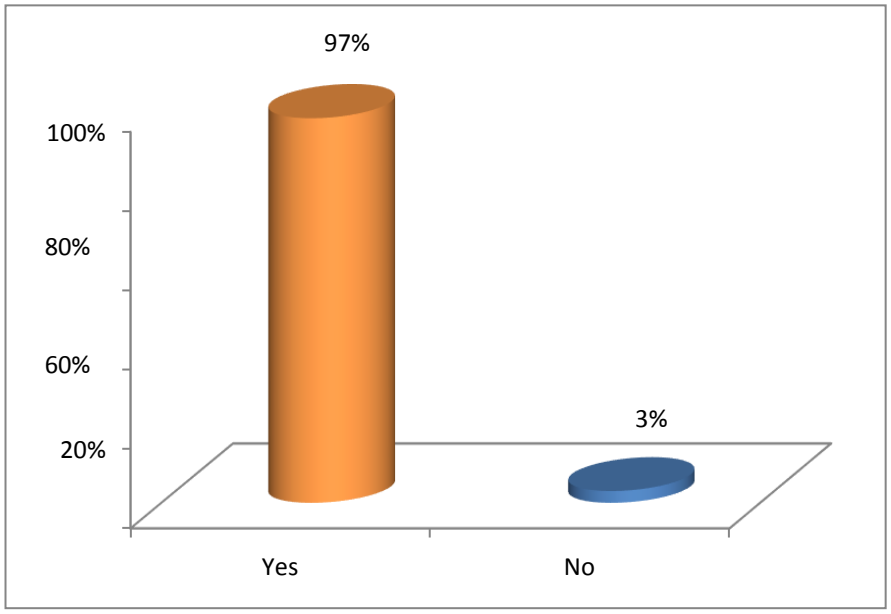

Figure 4.7: Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 knowledge about malnutrition complications (N=108)

Figure 4.7 shows that 104(97%) of the respondents knew that breathing difficulties and increased risk of chest infection and death are complications of malnutrition, and 4(3%) did not know.

4.3 Attitude towards malnutrition

Table 4.7 level of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022
Attitude towards malnutrition (n=108)

ITEM	POSITIVE ATTITUDE	NEGATIVE ATTITUDE	TOTAL
NUMBER N=108 (%)	63 (58	45 (42	108 (100
TOTAL SCORING	762	243	1005
MEAN ± SD	12.1 ±0.71	5.7± 0.16	9.3

The mothers Attitude was found to be 63 (58%) has positive attitude and 45(42 %) has Negative attitude (Table 4.7).

Table 4.8 Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 attitudes malnutrition (n=108)

Item	Agree		Strongly agree		Disagree		Strongly disagree		**TOTAL *(N)***
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)	
I should feed my child at least 3-5 times in a day	23	21.6	36	33.8	35	42.5	2	2.1	**108**
It is my responsibility to ensure that I buy healthy food that contains all nutrients	36	33.4	36	33.4	33	30.3	3	2.8	**108**
I must always feed my child with a balanced diet food	23	21	47	44	36	33	2	2.1	**108**
It is my responsibility to ensure that i do not buy my child junk food,eg. simba, biscuits, sweets	63	58.4	13	12.4	26	24.4	5	4.8	**108**
If i do not feed my child witha balanced diet food, my child can get malnourished	**7**	**6.5**	**23**	**21**	**31**	**28.5**	**48**	**44**	**108**

Table 4.8 indicates that 23 (21.6%) respondents agreed while 37 (33.8%) strongly agreed that they should feed their children at least 3-5 times in a day. Moreover, 46(42.5%) respondents disagreed while 2(2.1%) strongly disagreed that they should feed their children at least 3-5 times in a day. Furthermore, the findings also indicate that 36(33.4%) respondents agreed while another 36(33.4%) strongly agreed that it is their responsibility to ensure that they buy healthy food that contains all nutrients. Another view showed, the findings indicating that 33(30.3%) respondents disagreed while 8(2.8%) respondents strongly disagreed that it is their responsibility to ensure that they buy healthy food that contains all nutrients.

Furthermore, the findings indicate that 23(21%) respondents agreed whilst 49(44%) strongly agreed that they should always feed their children with a balanced diet. Moreover, 36(33%)

respondents disagreed while 2(2.1%) strongly disagreed that their children must always be fed balanced diet. The findings also indicate that 63(58.4%) agreed while 13(12.4%) strongly agreed that it is their responsibility as parents to ensure that they do not buy junk food for their children. Furthermore, 26(24.4%) disagreed while 52 (4.8%) strongly disagreed that it is their responsibility as parents to ensure that they do not buy junk food for their children. The findings further indicate that 70 (6.5%) respondents agreed while 23(21%) strongly agreed that if they do not feed their children with a balanced diet, their children can get malnourished. Moreover, 31(28.5%) respondents disagreed while 48(44%) strongly disagreed that if they do not feed their children with a balanced diet, their children can get malnourished.

4.4 Malnutrition preventive practices

Table 4.9 level of Mothers of Under-Five Malnourished Children at Ahmed Gasim Hospital December 2022 practices towards malnutrition (n=108)

ITEM	GOOD PRACTICES	BAD PRACTICES	TOTAL
NUMBER N=108 (%)	55 (51%)	53(49 %)	108 (100
TOTAL SCORING	358	196	554
MEAN ± SD	6.5 ± 0.23	3.7± 0.89	5.1± 0.43

The mothers practices was found to be 55 (51%) has good practices and 53(49 %) has bad practices (Table 4.9).

4.5.1 How can malnutrition be prevented?

Table 4.10: Malnutrition prevention (N=108)

Prevention	(f)	(%)
Eating balanced diet food	95	88
Eating biscuits and juice	2	2
Eating meat every day	5	4
Eating much potatoes	6	6
Total	108	100

Table 4.10 shows that 95(88%) respondents reported that eating balanced diet food can prevent malnutrition. Moreover, 6(6%) respondents reported that malnutrition can be prevented by eating potatoes, followed by 4(4%) who reported eating meat as way of preventing malnutrition. However, only 2(2%) respondents reported Eating biscuits and juice as a wayof preventing malnutrition.

4.5.2 What type of food do you buy for your child?

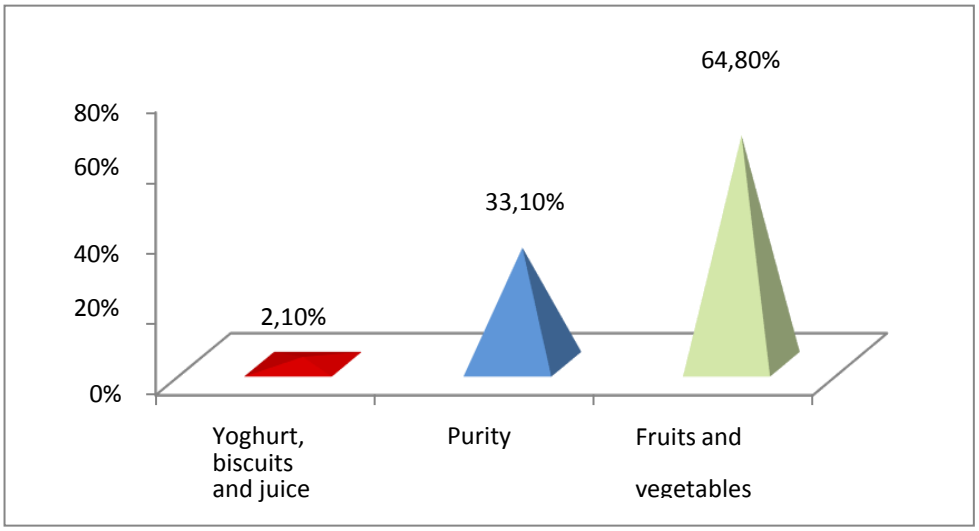

Figure 4.8: distribution on type of food respondents buy for their children (N=108)

Figure 4.8 indicates that 69(64.8%) respondents reported buying fruits and vegetables, and 36(33.1%) bought purity. Only 3 (2.1%) respondents reported buying yoghurt, biscuits and juice

4.5.3 How do you prepare your child's food?

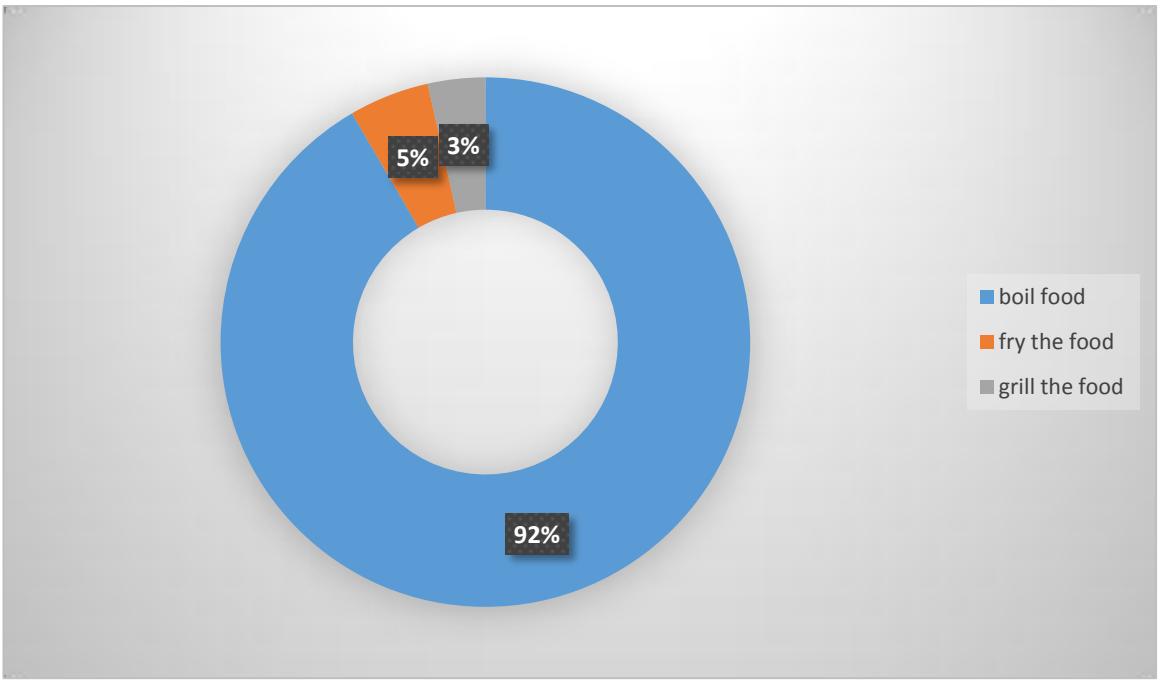

Figure 4.9: Distribution of respondents' food preparation methods (N=108)

Figure 4.9 shows that 99(91.6%) respondents boil food during preparation for consumption. Moreover, the findings show that 5 (4.9%) respondents fry the food while 4 (3.5%) grill the food when preparing it.

4.5.4 How often do you feed your child in a day?

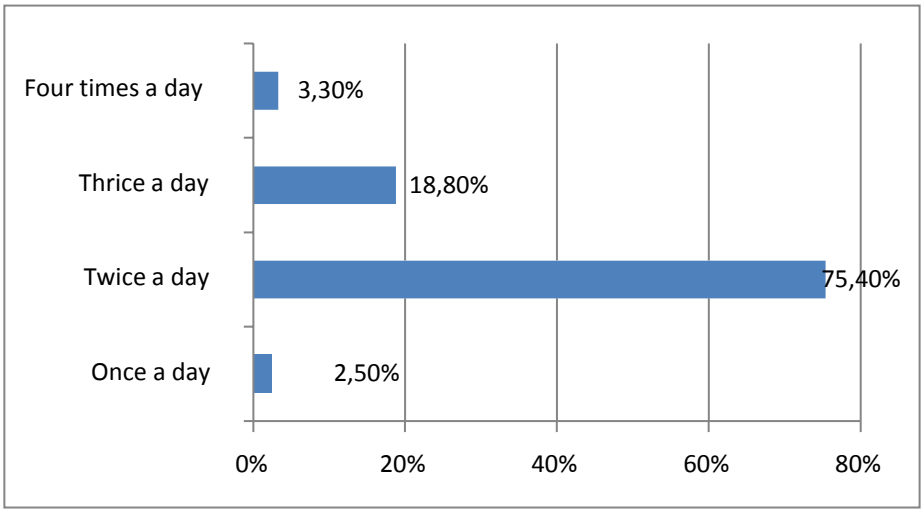

Figure 4.10: Respondents' normal of child feeding (N=108)

Figure 4.10 shows that 81(75.4%) respondents feed their children twice a day while 20(18.8%) reported feeding their children three times a day. Moreover, 4 (3.3%) respondents reported feeding their children four times a day. However, only 3(2.5%) respondents reportedfeeding their children once a day.

4.5.5 What types of food do you feed your child?

Table 4.11: Frequencies of food type given to children for feeding

N=108	Responses	
	N	Percent
Soft porridge	32	30.4%
bread	26	24.2%
cereals	29	27.1%
Breast feed	21	18.2%
Total	108	100.0%

Respondents were asked to indicate the type of food they give their children and they could give more than one answer. Overall, 108 respondents answered this question. Soft porridge was the most common food type given to children with 32 respondents. Cereals were the second (29) common food type, followed by bread with 26 respondents. Bread feeding was the less common with 21 respondents as indicated in table 4.11.

4.6 Association between mothers' knowledge, attitude and practice and scoio-demographic characteristic (comparative study)

Table 4.12 Association between mothers' knowledge, attitude and practice and scoio-demographic characteristic (comparative study) (n=108)

VS		p. value
mothers' knowledge	Mothers' age (years)	0.21
	Family income	0.96
	Employment	0.34
	No. of children in the family	0.28
	Mothers' Education level	0.04
mothers' attitude	Mothers' age (years)	0.31
	Family income	0.89
	Employment	0.46
	No. of children in the family	0.27
	Mothers' Education level	0.91
mothers' practice	Mothers' age (years)	0.63
	Family income	0.48
	Employment	0.21
	No. of children in the family	0.11
	Mothers' Education level	0.76

There was significant association between mothers knowledge and level of education but no significant association between mothers knowledge and other scoio-demographic characteristic, also no significant association between mothers' attitude and mothers' practice and other scoio-demographic characteristic as indicated in table 4.12

Chapter - V

Discussion, conclusion & Recommendations

5. Discussion, conclusion & Recommendations

5.1 Discussion

The objectives of the study was to determine the knowledge, attitudes and practices of mothers of under-five malnourished children regarding etiology, hygiene in preparing the child food and nutrition in Ahmed Gasim Hospital

The demographic and socioeconomic characteristics identified in the study population were Mothers occupation, and education level. The study has shown that ages ranged from 16 and 43 years with the median (interquartile range (IQR)) age being 23 (21 - 30) years. Most the respondents were aged between 22 and 30 years 59(54.6%), from Khartoum 70(64.8%), and unemployed 81(75.0%). The number of children of the respondents ranged from one to nine with a with a median of one (one to two) child (ren). Respondents with one and two children were constituted 40 (37.0)% and 36 (33.3%) of the total respondents

5.1.1 Knowledge on malnutrition

The study discovered that majority (92%) of the respondents heard about malnutrition, and most (54%) of the respondents heard about malnutrition from the clinic. Based on the findings it can be concluded that health practitioners in health facilities such as clinic disseminate information about malnutrition to mothers and primary care givers of children. Majority (85%) of the respondents knew that malnutrition involves a dietary deficiency. These findings concur with findings of the study conducted by Bodzewan (2015) [56] to assess mothers' knowledge on malnutrition and he discovered that (60%) mothers who were respondents in his study had good knowledge on what malnutrition is. These mothers reported that malnutrition results from inadequate intake of nutrients that the body needs to maintain healthy tissues and organ functions.

Furthermore, the study discovered that most (73%) respondents knew that underweight, swelling of face and legs are symptoms of malnutrition. Based on these findings, it can be inferred that most mothers know about symptoms of malnutrition. These findings are supported by Cumber, Ankraleh, and Monju, (2016) [50] who found that majority of (22) mothers with a percentage of 73% said when the child has large head, swollen stomach, and having weight loss these are symptoms of malnutrition. Mothers who were respondents in the study were asked about causes of malnutrition,

and the study discovered that most (62.8%) respondents knew that the lack of nutrients in the body causes malnutrition. These findings are supported by Bodzewan (2015) [56] who discovered statistically significant relationship between mothers' level of education and knowledge on causes of malnutrition ($p<0.001$).

5.1.2 Attitude towards malnutrition

The study discovered that mothers who were respondents that held a positive attitude towards feeding their child frequently commensurate to the need for food. This can be interpreted from the response mothers gave where most (23) agreed that they should feed their children at least 3-5 times a day. The study also discovered that the respondents held a positive attitude towards providing their children with healthy food. This is supported by responses that respondents gave wherein most (36) accepted responsibility to ensure that they buy healthy food that contains all nutrients. The study also discovered that most (23) respondents agreed that they must always feed their children with a balanced diet. Based on the findings, it can be inferred that respondents hold positive attitudes towards feeding their children with a balanced diet to prevent malnutrition. Moreover, the study also discovered that respondents held positive attitudes towards fighting and preventing malnutrition among their children. This can be interpreted from the responses that respondents gave wherein most (63) respondents agreed that it is their responsibility to ensure that they do not buy their children junk food, e.g. Potato chips, biscuits, sweets. The findings also found that most (48) respondents disagreed that if they do not feed their child with a balanced diet, their child can get malnourished. Based on the overall findings on attitudes towards malnutrition preventive practices, mothers who were respondents in the study held moderate positive attitude towards malnutrition preventive practices. These findings are supported by Bodzewan (2015) [56] , study done in India [57] and study done in Kilifi [58].

5.1.3 Malnutrition preventive practices

Furthermore, the study found that majority 95 (88.4%) of the respondents knew that eating a balanced diet prevents malnutrition. These findings concur with findings of Bodzewan (2015) [56] who discovered that most mothers [56 (48.28%)] prevented malnutrition by feeding the child with a balanced diet. The study discovered that majority 84 (77.9%) buy food for their children monthly. Buying food regularly ensures that fresh food eaten and not food is stored for long as some types of food expire before it could be finished. The study also found that most 69 (64.8%) respondents

bought fruits and vegetables for their children. Giving a child fruits and vegetables helps to build the body up and keep the body functioning well as they provide the body with nutrients. Furthermore, the study discovered that majority 98 (91.6%) of the respondents boiled food before they could give their children. Boiled food is easy for children to consume compared to fried and grilled food. The study also discovered that majority 81 (75.4%) of the mothers who were respondents fed their children twice a day. Another study done in Kenya, at Naivasha County Hospital found similar results [59].

5.2 limitation of study

In addition to strengths, limitations to this study exist. The study only included a limited number of children seen in a hospital and cannot be interpreted to be a generalized finding to a larger context without caution.

5.3 Conclusion

The study concludes that:

- There was a good knowledge of mothers with positive attitude and acceptable practices regarding malnutrition of children
- Significant relationship between level of education and knowledge on causes of malnutrition

5.4 Recommendations

Based on the findings of the study, the following recommendations were made on the impact of mothers' knowledge and attitudes on malnutrition preventive practices among children in Ahmed Gasim hospital

• By assessing the knowledge of mothers regarding malnutrition, the department of health continue with educational campaigns to address malnutrition amongst children and the use of social media should be introduced in order to ensure that every mother including young mothers have access to information about malnutrition.

• To increase mothers awareness about the significance of a balanced diet that contain nutrients that children's bodies need.

• Ministry of social solidarity provide school children with well-balanced breakfast meal

• Further research explore contributory factors to child malnutrition regardless of mothers being knowledgeable about malnutrition and preventive strategies

References

6.1 References

1. Ghosh S, Shah D. Nutritional problems in urban children. Indian pediatrics environment health project. Indian Pediatr 2004;41:682-96.
2. Sudheer K. A Textbook of Nutrition. 11th ed. India: Florence Publishers; 2010. p. 32.
3. Sreevani R. Malnutrition and mental development. Nightingale Nurs Times 2000;4:21.
4. Bamji MS, Krishnaswamy K, Brahmam GN. Text Book of Human Nutrition. 3rd ed. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.; 1996. p 206.
5. Mukherjee K. Malnutrition in under five children in Turbhe stores urban slums in Navi Mumbai. Int J Med Sci Public Health 2014;3:1127-31.
6. Gopalan C. The changing nutrition scenario. Indian J Med Res 2013;138:392-7.
7. World Bank. India, Undernourished Children: A Call For Reform and Action. Available from: http://www.web.worldbank.org/ WBSITE/ EXTERNAL/ COUNTRIES/ SOUTHASIAEXT/ 0,contentMDK:20916955~pagePK:146736~piPK: 146830~the SitePK:223547,00.html. [Last accessed on 2019 Mar 05].
8. Schroeder DG, Brown KH. Nutritional status as a predictor of child survival: Summarizing the association and quantifying its global impact. Bull World Health Organ 1994;72:569-79
9. Sahu SK, Kumar SG, Bhat BV, Premarajan KC, Sarkar S, Roy G, et al. Malnutrition among under-five children in India and strategies for control. J Nat Sci Biol Med 2015;6:18-23.
10. Singh GC, Nair M, Grubesic RB, Connell FA. Factors associated with underweight and stunting among children in rural Terai of Eastern Nepal. Asia Pac J Public Health 2009;21:144-52.
11. Ray SK, Mishra R, Biswa R, Kumar R, Halden A, Chattrjee T. Nutritional status of pavement dweller children of Calcutta city. Indian J Public Health 1999;43:49-54.
12. Bhat PN, Arnold F, Gupta K, Kishor S, Parasuraman S, Arokiasamy, et al. Household population and housing characteristics. In: (NFHS-3), National Family Health Survey. Vol. 1. Ch. 2. Mumbai India: International Institute for Population Sciences (IIPS) and Macro International. Ministry of Health and Family Welfare, Government of India 2005-06; 2007. p. 21-52.
13. Elia M (ed.). Guidelines for detection and management of malnutrition. Malnutrition Advisory Group, Standing Committee of BAPEN. Maidenhead: BAPEN, 2000.
14. Stratton R, Green CJ, Elia M. Diseaserelated malnutrition: an evidence-based approach to treatment. Oxon: Cabi Publishing, 2003.

15. Elia M, Stratton RJ. How much undernutrition is there in hospitals? Br J Nutr 2000;84:257–9.
16. Finch S, Doyle W, Lowe C et al. National diet and nutrition survey. London: The Stationery Office, 1998.
17. Ngaruiya, C., Hayward, A., Post, L. and Mowafi, H."Obesity as a form of malnutrition: over-nutrition on the Uganda 'malnutrition' agenda". Pan African Medical Journal, 2017;28, p. 49.
18. References Min, J., Zhao, Y., Slivka, L. and Wang, Y.,. "Double burden of diseases worldwide: coexistence of undernutrition and overnutrition-related non-communicable chronic diseases". Obesity Reviews, 19(1), pp. 49–61.
19. "The Double Burden of Malnutrition" . The Lancet Commission. December 16, 2019. Retrieved January 17, 2022.
20. WHO. The double burden of malnutrition. Policy brief. Geneva: World Health Organization; 2017.
21. Estecha Querol, S., Al-Khudairy, L., Iqbal, R., Johnson, S. and Gill, P . Adolescent undernutrition in South Asia: a scoping review protocol. BMJ Open, 2021; 10(1), p.e031955.
22. "Fact sheets - Malnutrition". www.who.int. Retrieved November 19, 2021.
23. Tesema, G., Yeshaw, Y., Worku, M., Tessema, Z. and Teshale, A. Pooled prevalence and associated factors of chronic undernutrition among under-five children in East Africa: A multilevel analysis. PLOS ONE, 2021;16(3), p.e0248637
24. Mrema, J., Elisaria, E., Mwanri, A. and Nyaruhucha, C. Prevalence and Determinants of Undernutrition among 6- to 59-Months-Old Children in Lowland and Highland Areas in Kilosa District, Tanzania: A Cross-Sectional Study. Journal of Nutrition and Metabolism, 2021, pp.1-9.
25. Kiarie, J., Karanja, S., Busiri, J., Mukami, D. and Kiilu, C The prevalence and associated factors of undernutrition among under-five children in South Sudan using the standardized monitoring and assessment of relief and transitions (SMART) methodology. BMC Nutrition,2021; 7(1).
26. Black RE et al., Maternal and child undernutrition: global and regional exposures and health consequences, The Lancet, 2008, 371(9608), p. 253.
27. Stratton R, Green CJ, Elia M. Diseaserelated malnutrition: an evidence-based approach to treatment. Oxon: Cabi Publishing, 2003.
28. Age Concern. Hungry to be heard. The scandal of malnourished older people in hospital. London: Age Concern, 2006.
29. Finch S, Doyle W, Lowe C et al. National diet and nutrition survey. London: The Stationery Office, 1998.

30. green CJ. Existence, causes and consequences of disease-related malnutrition inthe hospital and the community, and clinical and financial benefits of nutrition intervention. Clin Nutr 1999;18(Suppl 2):3–28.
31. Southern Africa Labour and Development Research Unit. Pathways to food security in South Africa: Food quality and quantity in NIDS Wave. Southern Africa Labour and Development Research Unit, CT.2016
32. Vorster, H. H. The link between poverty and malnutrition: A South African perspective. Journal of Interdisciplinary Health Sciences, 2011;15(1), 1-6.
33. World Bank. Investing in nutrition: The foundation for development an investment. World Bank .2015
34. Enström F, & Pettersson,C. Prevention of malnutrition in South Africa among children. Sophiahemmet University. unpublished master's thesis. 2015
35. Henry et al. Boys are more stunted than girls in sub- Saharan Africa: A metaanalysis of 16 demographic and Health Surveys, BMC Pediatrics.2007; 7, 17.
36. Babatunde R. O. Prevalence and determinants of malnutrition among under-five children of farming households in Kwara state Nigeria. Journal of agricultural science.2011
37. Olwedo M. A. Factors associated with malnutrition among children in internally displaced person's camps, Northern Uganda. Journal of Africa Health Sciences.2008; 8(4), 244252
38. Shrimpton. R. et al. Worldwide Timing of growth faltering: Implications for nutritional interventions. Paediatrics, 2001;107, 75-81.
39. Nguyen et al. Nutritional status and the characteristics related to malnutrition in children under-five years of age in Nghean, Vietnam. Journal of preventive medicine and public health, 2008;41(4), 232-119
40. Uganda Bureau of Statistics (UBOS) report 2007.
41. Jeyaseelam L. Risk factors for malnutrition in South India children. Journal of biosocial Science,1997; 1, 93-100.
42. Rayhan M.I. et al. Factors causing malnutrition among under-five children in Bangladesh. Pakistan Journal of nutrition.2006
43. Nure A.S. et al. Malnutrition of under-five children: Evidence from Bangladesh. Asian Journal of medical sciences 2001;2,113-119

44. Sommerfelt A. et al. Children's nutritional status. DHS comparative Studies, Calverton, Maryland, USA: Macro International Inc.1994
45. UNICEF report on Child health 2014, Geneva.
46. Teller H. et al. Levels and determinants of malnutrition in adolescent and adult women in southern Ethiopia. Ethiopia journal of Health Development, 2000;14, 57-66.
47. Bhan M. K., Raj P., Levine M.M. Management of severely malnourished child; A perspective from developing world, Oxford university press, Oxford UK.2003
48. Piniel, A. Factors contributing to severe acute malnutrition among the under five children in Francistown-Botswana. Cape Town: University of Cape Town. Unpublished master's thesis.2016
49. World Health Organization. The Right to Health. Fact Sheet No. 31. [Online] Available at: https://www.ohchr.org/Documents/Publications.2008
50. Cumber, S.,N., Ankraleh,N.,B, & Monju,N. Mothers' Knowledge on the Effects of Malnutrition in Children 0-5Years in Muea Health Area Cameroon. Journal of Family Medicine and Health Care.2016;. 2, No. 4, 36-42
51. Bodzewan, F. Malnutrition in the Under-Fives: Assessment of the Knowledge And Practices of Mothers in its Prevention: A study carried out in the Bamendankwe Health Area in North West Cameroon. South American Journal of Public Health. 2015; 3,(4)P 1-15
52. Reiher A, & Mohammadnezhad M. Awareness and characteristics of the mothers of malnourished children under 5 years old on south Tarawa, Kiribati in 2016: a descriptive study. MOJ Womens Health.2017;6(1):332–336.
53. Manohar,B., Reddy,N.S, Vyshnavi,P, and Sruthi P,s. Assessment Knowledge, Attitude and Practice of Mothers with Severe Acute Malnutrition Children Regarding Child Feeding. International Journal of Pharmaceutical and Clinical Research.2018; 10 (5), 150-154
54. Edith, M., & Priya, L. Knowledge, attitude and practice (KAP) survey on dietary practices in prevention of malnutrition among mothers of under-five children. Manipal Journal of Nursing and Health Sciences.2016;2(2), 19-24.
55. Berra, W. G. Knowledge, Perception and Practice of Mothers/Caretakers and Family's regarding Child nutrition in Nekemte town, Ethiopia. Science Technology Arts Research Journal.2013 2(4), 78-86

56. Bodzewan, F. Malnutrition in the Under-Fives: Assessment of the Knowledge And Practices of Mothers in its Prevention: A study carried out in the Bamendankwe Health Area in North West Cameroon. South American Journal of Public Health. 2015; 3,(4)P 1-15
57. Lodha, S., & Bharti, V. Assessment of complimentary feeding practices and misconceptions regarding foods in young mothers. International Journal of Food and Nutritional Sciences, 2013;2(3), 85-90.
58. Abubakar, A., Holding, P., Mwangome, M., & Maitland, K. Maternal perceptions of factors contributing to severe under-nutrition among children in a rural African setting. Rural and remote health, 2011;11(1), 1423.
59. Evelyne. A. Breastfeeding practices during the neonatal period among mothers delivering at Naivasha District Hospital Kenya (Doctoral dissertation, University of Nairobi).2013

6.2 Questionnaire

NAPTA College

Faculty of medicine

Questionnaire

Part I: Socio demographic Information

A) Mother's bio data

1. Age (years): ----------
2. Residence: Khartoum ☐ Omdurman ☐ Bahri ☐ Other ☐
3. Educational status: Unable to read and write ☐ Read and write ☐ Primary school ☐ Secondary school ☐ University and above ☐
4. Employment: Employed (formal) ☐ Employed (self) ☐ Unemployed ☐
5. No. of children in the family: One ☐ Two ☐ Three ☐ More than 3 ☐
6. Family income: Low ☐ Moderate ☐ High ☐

B) Characteristics of children

7. Age (years): lees than 2 years ☐ 2-3 years ☐ more than years ☐
8. Gender: Male ☐ Female ☐
9. Child attend (nursery): Yes ☐ No ☐
10. Position of child in family: 1st ☐ 2 end ☐ 3third ☐ other: specify……
11. Spacing between: 1st - 2 end ☐ 2 end- 3 third ☐ 3 third-4 th ☐

Part II: Assessment of knowledge of the mothers

12. Have you ever heard about Malnutrition? Yes ☐ No ☐
13. If yes, where did you hear about malnutrition? Clinic ☐ Hospital ☐ Radio/TV ☐ Friend ☐ Other: Specify……
14. Malnutrition involves a dietary deficiency? Yes ☐ No ☐
15. Loos of weight or weight gain, swelling of face and legs are symptoms of Malnutrition? Yes ☐ No ☐

16. What causes malnutrition? Diarrhea ☐ vomiting ☐ chronic disease ☐ Lack of nutrients in the body ☐ Other: specify……
17. Breastfeeding should be initiated within half an hour of delivery: Yes ☐ No ☐
18. An infant should exclusively breastfeed for the first 6 months: Yes ☐ No ☐
19. An infant should start complementary food at 6 month: Yes ☐ No ☐
20. Age of weaning : <1 month ☐ 1-18 month ☐ > 18 month ☐
21. Weaning: Sudden ☐ gradually ☐
22. Adequate breastfeeding, nutritious food, and regular deworming will prevent malnutrition in children: Yes ☐ No ☐
23. Cow milk is more convenient: Yes ☐ No ☐
24. Goat milk is more convenient: Yes ☐ No ☐
25. Hand washing with soap after visiting toilets: Always ☐ sometimes ☐ Never ☐
26. Wash child's hands with soap: Always ☐ sometimes ☐ wash only with water ☐
27. Source of drinking water: protected ☐ unprotected ☐
28. Vegetables are washed properly before cooking: Yes ☐ No ☐
29. Immunization of children is the best way to protect the child against infectious diseases: Yes ☐ No ☐
30. Breathing difficulties and increased risk of chest infection and death are complications of malnutrition? Yes ☐ No ☐

Part III: Assessment of Attitude of the mothers

31. I should feed my child at least 3-5 per day: Yes ☐ No ☐
32. It is my responsibility to ensure that I buy healthy food that contains all nutrients: Yes ☐ No ☐
33. I must always prepare my child a well-balanced diet: Yes ☐ No ☐
34. I must make sure that I do not buy my children junk food, eg , sweets, biscuits: Yes ☐ No ☐
35. If I do not give a well-balanced diet, my child can get malnutrition: Yes ☐ No ☐
36. The best way to prevent malnutrition is to eat a healthy, balanced diet, food that contains all nutrients? Yes ☐ No ☐
37. How to prevent malnutrition? Eating balanced diet ☐ Eating meat ☐ eating much Potatoes ☐ Eating biscuits and juice ☐

Part IV: Assessment of practice of the mothers

38. What type of food do you buy? Yoghurt ☐ Fruits and Vegetables ☐ meat ☐
    Eating biscuits and juice ☐ Other: specify…….
39. How do you prepare your child's food?

Grilled ☐ Boiled ☐ Fried ☐ Other: specify…….

40. How often do you feed your child? Once a day ☐ Twice a day ☐ Wait for him to cry ☐ other: specify……
41. What types of food do you feed your child?
    Breakfast= Soft porridge ☐ Bread ☐ Cereals ☐
    Lunch= Soft porridge ☐ meat ☐ Cereals ☐
    Supper= Soft porridge ☐ Pasta ☐ meat ☐
    Other: specify……