ASSESSMENT OF DIETARY INTAKE AND NUTRITIONAL STATUS OF CHILDREN (0-23MONTHS) ACCESSING CARE IN COMMUNITY INFANT AND YOUNG CHILD FEEDING (C-IYCF) PROGRAMME IN ZARIA LGA.

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BSc, PGDN (ABU, 2009, 2016)

(P18LSBC8002)

SUBMITTED TO THE DEPARTMENT OF BIOCHEMISTRY, FACULTY OF LIFE SCIENCE, AHMADU BELLO UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN NUTRITION (MSc.)

DEPARTMENT OF BIOCHEMISTRY,

FACULTY OF LIFE SCIENCE,

AHMADU BELLO UNIVERSITY,

ZARIA, NIGERIA

NOVEMBER, 2021

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NOVEMBER, 2021

DECLARATION

I hereby declare that this project titled "Assessment of Dietary Intake and Nutritional Status of Children (0-23 months) Accessing Care in Community Infant and Young Child Feeding (C-IYCF) Programme in Zaria LGA Kaduna State, Nigeria." was written by me and is a record of my research work. No part of this project has been presented in any previous application for another degree or diploma in this or any other institute. All information has been duly acknowledged in the text and a list of reference provided.

_____ _____

ABDULLAHI, Haruna Date
P18LSBC8002

CERTIFICATION

This project report entitled "Assessment of Dietary Intake and Nutritional Status of Children (0-23 months) Accessing Care in Community Infant and Young Child Feeding (C-IYCF) Programme in Zaria LGA Kaduna State, Nigeria." by **ABDULLAHI, Haruna,** meets the regulations governing the award of Master Degree in Nutrition of the Ahmadu Bello University Zaria, and is approved for its contribution to knowledge and literary presentation.

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Chairman, supervisory committee

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Mr. O. A. Owolabi Date
Member, supervisory committee

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Prof. A. B. Sallau Date
Head of Department

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Prof. S. A. Abdullahi Date
Dean School of Postgraduate Studies
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DEDICATION

I wish to dedicate this research project to my parents (Jibril Abdullahi and Fatima Abdullahi), brothers (Salihu Abdullahi and Mallas), and sister (Maimuna Abdullahi).

ACKNOWLEDGEMENT

I am sincerely grateful to the Almighty Allah who kept me, provided and saw me through the period of this programme.

I wish to acknowledge my project supervisors: Prof. E. Onyike and Mr. O. A. Owolabi for their tireless and valuable guidance, advice and constructive criticisms throughout this study. I remain very grateful.

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I sincerely appreciate the moral support of my parents, brothers, sisters, and my friends particularly Mr. Jonathan Luka and his family for successful completion of this study.

ABSTRACT

Infant and young child feeding practices have substantial consequences for the growth, development, and survival of infants and children during the first two years of life and throughout life. The study aimed to assess the dietary intake and nutritional status of children (0 -23 months) enrolled in community infant and young child feeding programme (C-IYCF) in Zaria Local Government Area of Kaduna State. A cross sectional study was conducted among 159 randomly selected mother-child pair attending the (C-IYCF) programme. A validated semi structured questionnaire was used to collect information on socio demographic and dietary intake information from the respondents. Anthropometric indices of weight for age, length for age and mid upper arm circumference (MUAC) measurements were used to assess the nutritional status of children. Biochemical parameters such as haemoglobin was measured using haemoglobin meter, zinc and iron were determined using the atomic absorption spectrophotometer. Almost half (44.7%) of the caregivers had household size of 6–10 people, while (23.9%), (19.5%), (6.9%) and (5%) responded to between 1–5, 11–15, 16–20 and above 20 people in a household respectively. About 47.8% do not have any form of education. The major occupation of the caregivers is farming in 48.4% and trading in 44.0%. Dietary intake consists mainly of legumes in 62.7% and cereals in 60.8%. On the average, over 74.8% of the caregivers were still breastfeeding during the period of the study, 22% of them initiated breastfeeding within one hour of birth and only 8.2% exclusively breastfed their children; majority, 91.7% of the caregivers breastfed on demand while 66.7% breastfed day and night. The study revealed that, 98.8% of the children sampled were malnourished while 15.1% of the children were wasted, 91.1% were stunted and 68.6% were underweight. Only 24.5% of them met minimum meal frequencies, 10.1% diversified their diet, while 47.5% met minimum

acceptable diet. Majority, 68.0% of the children had low haemoglobin level and 80.0% were iron deficient. More so, 68.0% of the children were deficient of zinc. Almost two third of the indices measured for the quality of C-IYCF programme was rated very good in Wucicciri , rated poor in Rafin Magaji and also poor in Babban Dodo primary health care. This study revealed inappropriate infant and young child feeding practices in the LGA despite being enrolled in the C-IYCF programme. Therefore, more attention needs to be paid to the specific behaviours surrounding feeding practices and other constraints to children in Zaria LGA of Kaduna State.

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ABBREVIATIONS AND ACRONYMS

BFHI Baby Friendly Health Initiative

ERC Ethics and Research Committee

FANTA Food and Nutrition Technical Assistance

FMOH Federal Ministry of Health

IFA Iron Folic Acid

IMNCI Integrated Management of Neonatal and Childhood Illness

MDD Minimum Dietary Diversity

MMF Minimum Meal Frequency

MAD Minimum Acceptable Diet

MUAC Mid-Up Arm Circumference.

NTDs Neural Tube Defects

NDHS National Demographic and Health survey

NFHS National Family Health Survey

NGO Non-Governmental Organization

PAHO Pan-American Health Organization

SPSS Statistical Package for Social Sciences

SMOH State Ministry of Health

UNICEF United Nations Children's Fund

USAID United State Agency for International Development

WHO World Health Organization

WLZ Weight for Length Z-scores

WAZ Weight for age Z-scores

LAZ Length for age Z-scores

SPRING Strengthening Partnerships, Results, and Innovation in Nutrition Globally

CHAPTER ONE

1.0 Introduction

Dietary intake refers to the daily eating patterns of an individual including specific foods and calories consumed and their relative qualities (WHO, 2017). Nutritional research has expanded to consider whole diet in addition to individual nutrients and foods (Hu, *et, al.*, 2002). Summarising multiple dietary components into an overall diet measure taken to account the correlations between dietary constituents by exploring the effect of food combinations (Hu, *et, al.*, 2002, Moeller, *et, al.*, 2006). Whole-diet measures can be based on food intake assessed against a pre-determined index, or empirically, whereby variables are reduced into a small number of components through statistical manipulation (Hu, *et, al.*, 2002). For example, factor analysis is used to derive a dietary pattern score reflecting foods that correlate with each other (Smithers, *et, al.*, 2012). In adults, and less so in children, dietary patterns have been shown to be associated with health outcomes and socio demographic factors (Smithers, *et, al.*, 2001, Kant, *et, al.*, 2004). Although early life is a significant period when dietary preferences and habits are first established, laying the foundation of adult eating habits (Dewnowski, 2009). As dietary patterns are likely to be age-specific, understanding early-life dietary patterns, their determinants and their influence on later health is important for developing strategies to improve nutrition in early childhood (Dewnowski, 2009).

Nutritional status is defined as the evident state of an individual in relation to their nourishment (consumption and utilization) (Amosu, *et, al.*, 2011). The nutritional status of children is important as it determines their health, physical growth and development, academic performance and progress in life (Dibley, et, al., 2001). All children have the right to adequate nutrition, which is essential for attainment of the highest standard of

health (WHO, 2004). Moreover, good nutrition has been reported to be the corner stone for survival, health and development in the current and succeeding generations (WHO, 2005). Therefore, the physical, mental, and social and nutritional status of children, as well as other characteristics related to malnutrition should be evaluated periodically to monitor malnutrition, thereby enabling appropriate measures that can prevent it to be implemented (Kauriki, *et, al.,*2002; Taguri, *et, al.,*2008).

Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are too much such that the diet causes health problems (Kumar, et, al., 2006). It may involve calories, protein, carbohydrates, vitamins or minerals (UNICEF, 2010). It can also be defined as the deficiencies, excesses, or imbalance in a person intake of energy or nutrients (WHO, 2018).

Therefore, malnutrition is a serious medical condition marked by a deficiency of energy, essential proteins, fats, vitamins, and minerals in a diet (Liu, et, al., 2006). Over 10 million children aged less than two years (under-two children) died annually from preventable and treatable illnesses and almost all these deaths occur in poor countries (Black, *et, al.,*2003). Malnutrition contributes to more than one-third of all deaths of under-two children (UNICEF, 2009). Currently, 195 million under-two children are affected by malnutrition; 90% of them live in sub Saharan Africa and South Asia. At least 20 million children suffer from severe acute malnutrition (SAM), and another one hundred and fifty-seven million are undernourished (Black, *et, al.,* 2008). Malnutrition is the most recognizable and perhaps most untoward consequence of poverty in children (Goel, *et, al.,* 2007).

In sub-Saharan Africa and in most developing countries, extreme urban poverty is concentrated in temporary or informal squatter settlements and slum areas. Infrastructure is not keeping up with massive urbanization throughout Africa (Goel, *et,*

al., 2007). As a result, each year a growing number of people live within informal settlements. Informal settlements are made up of improvised dwellings often made from scrap materials, such as corrugated metal sheets, plywood, and polythene-sheets (UNICEF, 1994). They tend to be densely populated and characterized by limited basic services and infrastructure for providing clean water, sanitation facilities, solid-waste management, roads, drainage, and electricity, if any is available at all. In concert with poverty, a number of factors within informal settlements, including overcrowding, substandard housing, unclean and insufficient quantities of water, and inadequate sanitation, contribute to a high incidence of infectious diseases and to significant rates of childhood mortality (UNICEF, 1994).

Infant and young child feeding programme (IYCF) is a key priority information program of government to improve survival, growth and development of children in the first 1000 days of life (UNICEF, 2017). IYCF practices are crucial for nutritional status, growth, development, health, and ultimately the survival of infants and young children (Bhuta, *et, al.,* 2008, Saha, *et, al.,* 2008). Worldwide, suboptimal breastfeeding still accounts for deaths of 1.4 million children aged less than five years (under-five mortality) (Liu, et, al., 2011). The timely introduction of complementary feeding can prevent almost 6% of under-five mortality (Jones, *et, al.,* 2003). It was estimated that, if 90% of infants are covered with a package of intervention to protect, promote, and support the optimal IYCF practices, almost one-fifth of overall under-five mortalities can be averted (Jones, *et, al.,* 2003). The poor complementary feeding practices mean that many children continue to be vulnerable to irreversible outcomes of stunting, poor cognitive development, and significantly increased risk of infectious diseases, such as diarrhoea and acute respiratory infection (WHO, 1998, Hop, *et, al.,* 2000, Saha, *et, al.,* 2008). The poor complementary feeding practices has a tremendous impact in a

developing country, like India, with a high burden of disease and low access to safe water and sanitation. Even in developed countries, recent studies have underscored the role of IYCF practices in reducing child mortality (Chen, *et, al.*, 2004).

The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life with early initiation and continuation of breastfeeding for two years or more together with nutritionally-adequate, safe, and age-appropriate complementary feeding starting at six months (WHO, 2003). The WHO and United Nations Children Fund (UNICEF) have articulated a global strategy for infant and young child-feeding. Based on these guiding principles, the Government of India, in collaboration with international agencies, has adopted the culturally-acceptable IYCF guidelines, which were incorporated in the Integrated Management of Neonatal and Childhood Illness (IMNCI) Programme (MHFW, 2003).

The National Family Health Survey (NFHS) has provided useful national and state level information on the IYCF practices (MHFW, 2003). Available data showed a gross inter-state variation. However, the NFHS was not designed to provide district-level. (Sinhababu, *et, al.*, 2010).

Nigeria was considered an ideal location for the evaluation based on several factors, including the early adoption and uptake of the Package by the FMOH and their willingness to partner with UNICEF and SPRING on this endeavor (UNICEF, 2010). Multiple factors influenced the selection of Nigeria as the focus of the evaluation, including the fact that it was one of the first countries to officially adopt the (C-IYCF) Counselling Package as a national program. Beginning in 2010, under the leadership of the Nigerian FMOH, a strategic investment was made in adapting the core elements of the generic package to the Nigerian context. The adaptation process was supported

technically and financially by both UNICEF and the United States Agency for International Development (USAID). The rollout of the Nigerian Package began in 2013, with support from the FMOH, SMOH, UNICEF, and SPRING. To date, the package has been implemented, to varying degrees, in nearly every state in Nigeria. (UNICEF, 2010). All partners agreed that for the purposes of the evaluation, the Package would be implemented at scale in one local government area (LGA) in Kaduna State that had not previously benefited from any IYCF-related programme (UNICEF, 2010).

1.1 Statement of Research Problem

Under nutrition remains one of the key factors associated with global loss of life in young children (Black, *et, al.,* 2003, Jones, *et, al.,* 2003, UNICEF, 2009, Black, *et, al.,* 2010). Micronutrients deficiency is a major contributor to childhood morbidity and mortality (Best, *et, al.,* 2010).

Poor IYCF practices are links to concomitant illnesses such as diarrhoea and high infant mortality in under-5 children are most prevalent in the poorest countries (Black, *et, al.,* 2003, Jones, *et, al.,* 2003, Blakely, *et, al.,* 2005). It was reported that poor complementary feeding practices mean that many children continue to be vulnerable to irreversible outcomes of stunting, poor cognitive development, and significantly increased risk of infectious diseases, such as diarrhoea and acute respiratory infection (WHO, 1998, Hop, *et, al.,* 2000, Saha, *et, al.*, 2008).

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According to the work reported by USAID and UNICEF in Kaduna state 2018, fewer than 2 in 5 children under six months old are exclusively breastfed, (29%) and complementary feeding practices are equally poor. One third of all children under the age of five have stunted growth, a sign of chronic malnutrition, and 1 in 10 children is acutely malnourished (11%) (USAID and UNICEF, 2018). The prevalence of nutritional status of under five children in Kaduna State is unacceptably low based on; stunting (50.5%), wasting (5.2%), and underweight (24.3%) (NDHS, 2018).

1.2 Justification of the study

Malnutrition is a key factor associated with public health issue in children (0-23months) in developing countries (NNHS, 2018). There is limited report, however, on nutrient intakes and nutritional status of children under 2 years of age on community infant and young feeding (C-IYCF) programme in Kaduna State (NNHS, 2018).

This study is designed to recognize the gap in evidence-based guidance, tools, and other resources for training and counselling at the community level, UNICEF and its partners officially launched the generic C-IYCF Counselling Package (UNICEF, 2010). To the best of our knowledge, there is no any report on the nutritional status for the catchment area of the study location despite many governmental and non-governmental interventions over the years (NNHS, 2018).

Therefore, there is need to generate information on the dietary intake and nutritional status of children (0-23months) on community infant and young child feeding

programme and provided baseline data that can be used for future policy and decision making.

1.3 Aim and Objectives

1.3.1 Aim

The aim of this study was to assess the dietary intake and nutritional status of children (0-23months) involved in community infant and young child feeding (C-IYCF) programme in Zaria local government of Kaduna State.

1.3.2 Specific objectives

This work seek to:

i. Establish the socio-demographic characteristics of the caregivers involved in (C-IYCF) programme in Zaria LGA of Kaduna State.
ii. Determine the MUAC, weight and length of the children (0-23months) involved in (C-IYCF) programme.
iii. Assess the infant and young child feeding (IYCF) practices among the caregivers.
iv. Examine the level of haemoglobin, serum iron and serum zinc of the children (0-23months).
v. Evaluate the quality of the community-infant and young child feeding (C-IYCF) programme in Zaria, LGA.

CHAPTER TWO

2.0 Literature Review

2.1 Malnutrition

Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are too much such that the diet causes health problems. The term malnutrition generally refers to both under nutrition and over nutrition (WHO, 2005). Malnutrition has been identified as a burden that mainly affects individuals in resource-constraints settings and has been thought to be an indicator of poverty. The condition is furthered by biological vulnerabilities, inadequate resources and cultural influences, which further a child's vulnerability to disease and exacerbate the poverty cycle (WHO, 2005).

2.2 Types of Malnutrition

Under Nutrition: – Acute malnutrition and Micronutrient deficiencies

Over Nutrition: – Overweight and obesity with Health consequences (diabetes, cardiovascular diseases). Co-existence of under and over nutrition: "double burden of malnutrition". Obesity and acute malnutrition in the same family while Obesity and micronutrient deficiencies in the same individual indicate Chronic and acute malnutrition (Marie, 2016)

2.3 Basic Concept of Epidemiology of Malnutrition

Epidemiology is the study (scientific, systematic, and data-driven) of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (neighbourhood, school, city, state, country, global) (Elli, et, al., 2008).

Acute malnutrition is a form of under nutrition in which protein, energy or both are deficient in an individual. It most often strikes early in childhood. It is one of the most prevalent and devastating forms of malnutrition in the world, afflicting one in every four children worldwide (Elli, et, al., 2008).

Children with primary acute malnutrition generally are found in developing countries including Nigeria, because of inadequate food supply caused by socioeconomic, political, and occasionally environmental factors such as natural disasters (Hamidu, *et, al.,* 2003). In Nigeria, most of the data reported on acute malnutrition are from the southern part of the country. These data indicate acute malnutrition to be one of the major causes of child death in Nigeria (Hamidu, *et, al.,* 2003, Ubesie, *et, al.,* 2012).

Among the four principal causes of mortality in young children worldwide, under nutrition has been ascribed to be the cause of death in 60.7% of children with diarrheal diseases, 52.3% of those with pneumonia, 44.8% of measles cases, and 57.3% of children with malaria (Ubesie, *et, al.,* 2012). More than 50% of all the childhood deaths are attributable to under nutrition, with relative risks of mortality being 8.4 for severe malnutrition, 4.6 for moderate malnutrition, and 2.5 for mild malnutrition as estimated by analyses of 28 epidemiologic studies done across 53 countries (Hamidu, *et, al.,* 2003, Ubesie, *et, al.,* 2012).

Most of the deaths (> 80%) occur among those with mild or moderate malnutrition (weight for age 60% to 80%). This is explained by the fact that although the risk of death is greatest for those with severe malnutrition, these extreme cases only make up a small fraction of total number of children with malnutrition. (Grover and Looi, 2009).

2.4 Determinants of Malnutrition

The determinants of malnutrition are broadly classified under four distinct categories: Environmental factors including the physical and social environment, behavioural factors, healthcare service related and biological factors. The socio-cultural factors play an important role wherein, it affects the attitude of the care giver in feeding and care practices, faulty feeding practices in addition to poor nutritional status of the mother further worsens the situation (Dechenla, 2014). The vicious cycle of poor nutritional status of the mother leading to low birth weight child further exposes the child to susceptibility to infections which aggravates the situation. Acute malnutrition is a critical problem with many determinants playing a role in causing this vicious cycle of undernutrition. (Dechenla, 2014).

2.5 Causes of Malnutrition

There are various causes of malnutrition which include immediate causes, basic causes and underlying causes which are discussed below as shown in figure 2.1(The conceptual framework for malnutrition).

i. Immediate causes

Immediate causes of malnutrition include adequate food intake and diseases. Feeding practices for girls may be poorer than those for boys due to social norms. When food is in short supply, one coping strategy may be that women and girls eat less, leaving more food for men and boys. Some diseases can result to malnutrition like obesity which is as a result of excess nutrients intake and can also lead to chronic diseases such as diabetes, high blood pressure, heart diseases, kidney diseases (UNICEF, 2017).

ii. Underlying causes

Women's control over income is a key promoter of household food security and nutrition. Women are more likely than men to spend extra income on food. Women

with more control over resources are also in a better position to provide care to children. Early pregnancies, short birth intervals, heavy workloads and domestic responsibilities can make women and their children vulnerable to undernutrition (UNICEF, 2017).

Women may experience constraints to the use of health services (mobility or access to resources). Evidence suggests that women with a higher status (in terms of decision making ability) will be better able to generate and direct resources such as food, care, clean water, and preventative and curative health care to young children (UNICEF, 2017).

iii. Basic causes

Basic causes of malnutrition include income and poverty, family and community resources and control, formal and informal infrastructure such as civil society and government structures, context such as political, security, cultural, social and economic context and potential resources such as human, structural, natural and financial resources. Adult undernutrition constrains the ability of women to earn income, which tends to impair the nutritional status of their existing children. Women with control over resources tend to have a larger say in the allocation of resources in the household. Education is crucial for income generation and behaviour change (UNICEF, 2017).

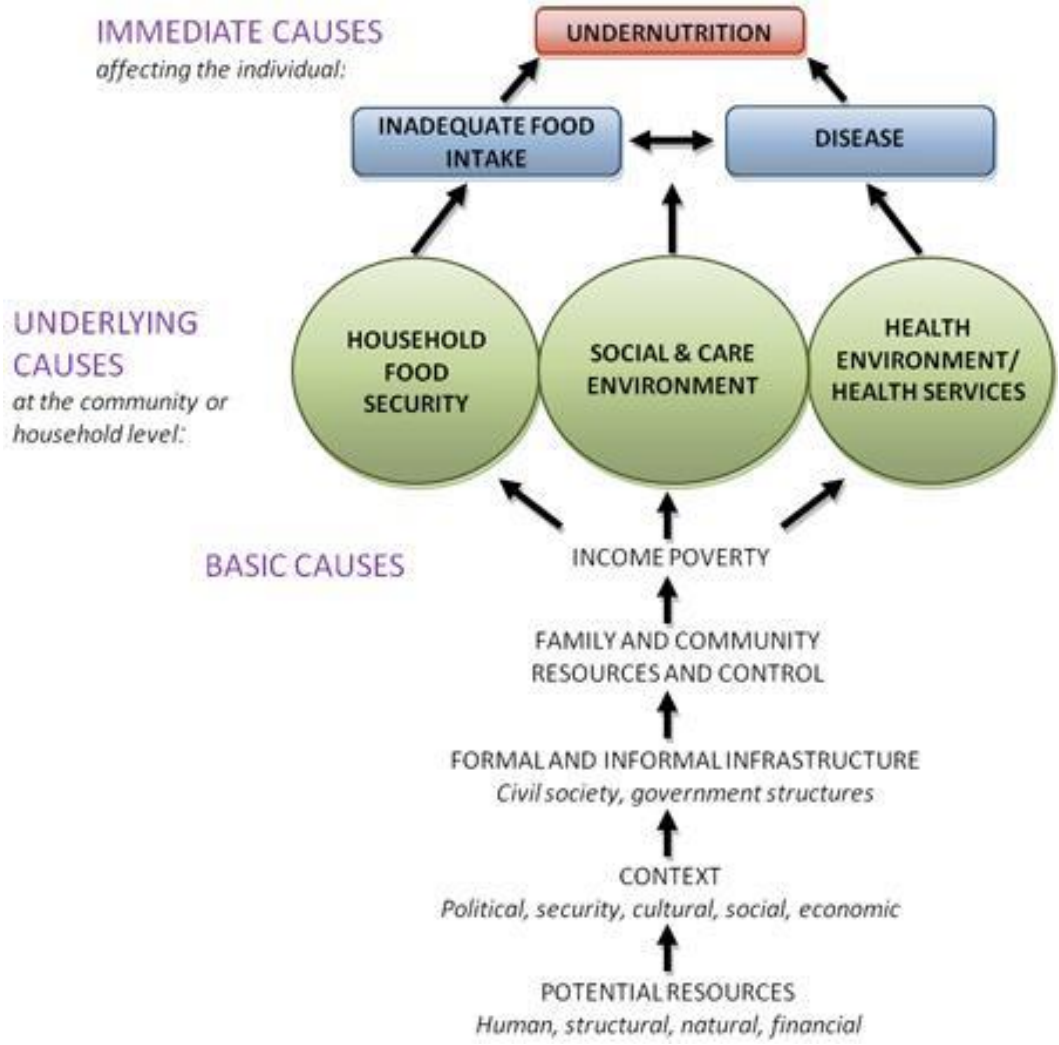


Figure 2.1The Conceptual Framework for Malnutrition (UNICEF, 2017)

2.6 Etiology of Undernutrition

Undernutrition is a multi- deficiency state and not just a deficiency of protein and energy. Marasmus is a semi-starvation, which includes the deficiency of energy, protein and other nutrients. There are several theories for kwashiorkor (Belachew, *et, al.,* 2001).

i. Low protein intake: -

Low protein intake, which leads to hypo-albuminemia, which in turn leads to edema. However, different studies have shown that children can have low albumin without edema, it was found difficult to produce edema in animals on protein deficient diet, and edema may go and come unpredictably regardless of their protein intake (Belachew, *et, al.,* 2001).

ii. Dys-adaptation

Edema is determined not only by diet but also by intrinsic differences among children with regard to their protein requirement or hormonal response. Hence, kwashiorkor develops in children that poorly adapted and Marasmus develops in children that are well adapted to the states of lower nutrient intake (Belachew, *et, al.,* 2001).

iii. Free radical damage

The outcome of malnutrition is determined by extrinsic factors (novae) leading to free radical formation and intrinsic factors (micronutrient deficiencies) which may impair body's ability to scavenge free radical species. This results in membrane damage and leakage of fluid from the cells. This theory accommodates all other theories (Belachew, *et, al.,* 2001).

iv. Aflatoxins: - It was reported from a study in Sudan by Hendricks that children with Aflatoxins developed edema compared to those with no aflatoxin intake (Belachew, *et, al.,* 2001).

2.7 Pathogenesis of Undernutrition

Marasmus and Kwashiorkor in their extreme forms have basically different pathogenesis. The initiation of the pathogenesis of both problems can be traced back to the time of weaning. Kwashiorkor develops following the additional demand levied on the body's already marginalized nitrogen balance due to infection of a child that is on monotonous starchy family diet (Belachew, *et al.,* 2001). As a result of fragile nitrogen balance that the child has, negative nitrogen balance sets in, when the available nitrogen is used to produce antibodies or other acute phase reactants in the face of infection, this will lead to kwashiorkor. On the other hand, Marasmus develops due to negative energy balance as a result of "starvation therapy" that follows the bouts of diarrhea. (Belachew, *et, al.,* 2001).

i. Global prevalence levels of under nutrition in children (0-59months)

The global prevalence levels of undernutrition in under five children showns that, underweight has cut off of <10% for low prevalenc, 10-19% for medium prevalence, 20-29% for high prevalence and >30% for very high prevalence while stunting has cut off of <20% for low prevalence, 20-29% for medium prevalence, 30-39% for high prevalence and >40% for very high prevalence and wasting has cut off of <5% for acceptable, 5-9% for poor, 10-14% for serious and >15% for critica (WHO, 1995)

ii. Global prevalence of stunting in infants and young children (0-59months)

Global prevalence of stunting in infants and young children described that, Africa has 52% prevalence of stunting in infants and young children in 1990 and 38% in 2014,

America has 15% in 1990 and 7% in 2014, South East Asia has 59% in 1990 and 34% in 2014, Eastern Mediterranean has 40% in 1990 and 26% in 2014 and Globally 40% in 1990 and 24% in 2014 (WHO, 1995)

iii. Factors that may affects the level of children (0-59months) malnutrition

The Factors that may affects the level of children (0-59months) malnutrition include lack of knowledge -People do not understand the nutritional nature of their Child's health problem, poverty - Lack of means to obtain and provide food to their child (as in the case of war), famine and vulnerability- Destitution, being orphan (Example HIV taking away parents Lives). Infections - There is a reciprocal relationship between malnutrition and infection. During infection, the requirement for nutrients increases, there will be increased loss of nutrients due to diarrhoea; genesis of fever and other acute phase reactants is at the expense of nutrients, cultural factors- Different biases as to who should take the lion's share of the family's food (Example, age bias—older children are given more food than the smaller ones, sex bias—Male children are more favoured in getting nutritious food than female children in some families, etc.),and mal-distribution of foodstuff - Within the family, it occurs between the different ages and sexes due to biases, food prejudices and taboos. It also occurs between the different regions of a country because of inappropriate food and nutrition policy, poor marketing and distribution system due to different reasons like embargo, country under-siege, etc.

2.8 Pathophysiology of Undernutrition

Hyperpigmentation, which then splits when stretched, resulting in erosions and underlying paler, erythematous skin. These patchy areas of dark and pale skin give the impression of crazy paving or flaky paint, particularly over limbs and buttocks (Grover and Looi, 2009). There are approximately 40 known essential nutrients which, when not

available in the right balance, result in undernutrition and increase the risk of severe illness and likelihood of death in young children. The nature and consequences of deficiencies of these essential nutrients is determined by the body's physiological response to their deprivation. The essential nutrients have been classified into Type 1 (functional) nutrients and Type 2 (growth) nutrients (Osama, 2009).

Examples of Type 1 nutrients are iron, iodine, vitamin C and vitamin A. In response to Type 1 nutrient deficiency, children's bodies continue to grow using up the stored nutrient, eventually leading to tissue depletion, metabolic dysfunction and consequent ill health. Examples of Type 1 nutrient deficiency include iron deficiency anaemia and scurvy (Osama, 2009).

Examples of Type 2 nutrients are potassium, magnesium, zinc, selenium and amino-acids. In response to a Type 2 nutrient deficiency, the body stops growing and repairing tissue to conserve nutrients, and the body breaks down its own tissue to make the nutrients available. While Type 2 nutrient deficiency can be identified through anthropometric measurements (wasting and stunting), identifying the deficit nutrients is complex because deficiency in one Type 2 nutrient is often accompanied by deficiency in other Type 2 nutrients. Undernutrition accompanied by infection can operate in a self-reinforcing downward cycle of tissue depletion and lowered resistance to disease (Osama, 2009).

2.9 Adaptation of Undernutrition

Inadequate energy intake leads to various physiologic adaptations, including growth restriction; loss of fat, muscle, and visceral mass; reduced basal metabolic rate, and reduced total energy expenditure. The biochemical changes in prolonged starvation involve complex metabolic, hormonal, and glucoregulatory mechanisms. Metabolic

changes progress from the early phase, where there is rapid gluconeogenesis with resultant loss of skeletal muscle caused by use of amino acids, pyruvate and lactate, to the later protein conservation phase, with fat mobilization leading to lipolysis and ketogenesis. Major electrolyte changes including sodium retention and intracellular potassium depletion can be explained by decreased activity of glycoside-sensitive energy-dependent sodium pump to increased permeability of cell membranes in kwashiorkor. Some studies suggest that marasmus represents an adaptive response to starvation, while kwashiorkor is a maladaptive response.

Aflatoxins have been proposed to have a role in the pathogenesis of kwashiorkor. Reactive oxygen species also have been postulated to have a role in its pathogenesis. This is supported by the observation that supplementation with N-acetylcysteine, a free radical scavenger, leads to more rapid resolution of signs and symptoms and improved erythrocyte glutathione levels. (Grover and Looi, 2009).

2.10 Diagnosis of Malnutrition

The diagnosis of malnutrition rests mainly on meticulous clinical examination for the symptoms and signs of the syndrome plus anthropometric assessments using different methods. Additionally, one may need laboratory investigation for the assessment of complications and other health problems associated with malnutrition (Grover and Looi, 2009).

i. Clinical examination

Malnutrition has the potential to affect all organ systems in the body. Initially, clinical findings include lack of adiposity and subcutaneous tissue, poor muscle bulk, irritability, and edema. As malnutrition progresses, growth is delayed, leading to stunting, and other systems become involved, with changes in hair, skin, nails, mucous

membranes, angle of the mouth, gums, eyes, bones and other organs. Micronutrient deficiencies, particularly deficiencies of vitamins and minerals, are common in malnourished patients, so many patients also will exhibit signs of these deficiencies (Grover and Looi, 2009).

ii. Clinical signs of malnutrition

The sites and clinic signs of malnutrition include face for moon face (kwashiorkor), simian faces (marasmus)**,** eye for dry eyes, pale conjunctiva, Bitot's spots (vitamin A), body for body swollen, stunting, wasting of subcuteous tissue, mouth for angular stomatitis, cheilitis, glossitis, spongy bleeding gums (vitamin C), parotid, air for dull, sparse and brittle hair, and hypopigmentation, teeth for enamel mottling, delayed eruption, Skin for loose and wrinkled (marasmus), shiny and edematous (kwashiorkor), dry, follicular hyperkeratosis, patchy hyper- and hypopigmentation, erosions, poor wound healing, Nail for koilonychia, thin and soft nail plates, fissures or ridges, musculature for muscles wasting, particularly in the buttocks and thighs, skeletal for deformities usually a result of calcium, vitamin D, or vitamin C deficiencies, abdomen for distended - hepatomegaly with fatty liver, ascites may be present, and behavior for lethargic, apathetic (Grover and Looi, 2009).

iii. Laboratory investigation

Laboratory investigations can be useful to identify deficiencies before clinical symptoms develop, confirm deficiencies associated with specific disease states, and monitor recovery from malnutrition. The most useful tests in assessing nutritional status are haemoglobin and red cell indices, and serum albumin. Electrolytes, specifically potassium, magnesium, and phosphate, should be monitored closely in the early treatment phase of malnutrition to avoid refeeding syndrome. WHO recommends

performing the following tests in malnourished children: blood glucose, haemoglobin and blood smear, electrolytes, serum albumin, urine microscopy and culture, stool microscopy and culture including for parasites, and human immunodeficiency virus testing (WHO, 2017). Specific testing should be directed by the history and physical examination. Complete blood cell count measuring haemoglobin, red cell indices, and blood film is helpful to demonstrate anaemia, which is usually normochromic but can be microcytic from iron deficiency. Blood film can identify malarial parasites, if appropriate. Additional testing including iron studies, vitamin B12, and folic acid measurements are also useful when assessing for their deficiencies.

Biochemical testing is useful in determining hypoglycaemia; electrolyte imbalances, particularly that of sodium, potassium, phosphate, magnesium, and protein stores with serum albumin and pre albumin levels (Grover and Looi, 2009).

2.11 Anthropometric Assessments

Anthropometry **assessments** is the measurement of weight, height and other body proportions (WHO, 2005). The anthropometric assessments can be done using the following methods of classifications (Belachew, *et, al.*, 2001).

Table 2.1: Gomez classification (weight-for-age)

Percentage (%) NCHS Reference	Level of malnutrition
90-109	Normal
75-89	Mild (Grade I)
60-74	Moderate (Grade II)
< 60	Severe (Grade III)

Table 2.2: Well-come classification (weight-for-age)

Percentage (%) NCHS Reference	Level of Malnutrition	
	EDEMA	***NO EDEMA***
60-79%	Kwashiorkor	Underweight
< 60%	Marasmic-Kwashiorkor	Marasmus

Table 2.3: WHO Classification system (Based on NCHS data)

cut off (z scores)	***level of malnutrition***
<-1 z scores to >--2	Mild
> -3 z-score to <-2	Moderate
<-3 z scores	Severe

2.12 Effects of Malnutrition

Malnutrition increases the risk of infection and infectious disease, and moderate malnutrition weakens every part of the immune system (Mahalakshimi, 2000). For example, it is a major risk factor in the onset of active tuberculosis. Protein and energy malnutrition and deficiencies of specific micronutrients (including iron, zinc, and vitamins A) increase susceptibility to infection. Malnutrition affects HIV transmission by increasing the risk of transmission from mother to child and also increasing replication of the virus. In communities or areas that lack access to safe drinking water, these additional health risks present a critical problem (Jacques, *et, al.,* 2005).

Lower energy and impaired function of the brain also represent the downward spiral of malnutrition as victims are less able to perform the tasks they need to, in order to acquire food, earn an income, or gain an education (Lawrence, *et, al.,*1996). Hypoglycemia (low blood sugar) can result from a child not eating for 4 to 6 hours. Hypoglycemia should be considered if there is lethargy, limpness, convulsion, or loss of consciousness. If blood sugar can be measured immediately and quickly, perform a finger or heel stick (Thirumani, *et, al.,* 2005).

2.13 Prevention of Malnutrition

Malnutrition increases the risk of infectious diseases and death and among the children (0-59months), therefore there a need for preventive measures to curb the malnutrition.

i. Food security

The effort to bring modern agricultural techniques found in the West, such as nitrogen fertilizers and pesticides from Asia, called the Green Revolution, resulted in decreases in malnutrition similar to those seen earlier in Western nations. This was possible because of existing infrastructure and institutions that are in short supply in Africa, such as a system of roads or public seed companies that made seeds available.

Investments in agriculture, such as subsidized fertilizers and seeds, increases food harvest and reduces food prices. For example, in the case of Malawi, almost five million of its 13 million people used to need emergency food aid. However, after the government changed policy and subsidies for fertilizer and seed were introduced against World Bank structures, farmers produced record-breaking corn harvests as production leaped to 3.4 million in 2007 from 1.2 million thus making Malawi a major food exporter. This lowered food prices and increased wages for farm workers. Such investments in agriculture are still needed in other African countries like the Democratic Republic of the Congo. The country has one of the highest prevalence of malnutrition even though it is blessed with great agricultural potential new technology in agricultural production also has great potential to combat under nutrition.

By improving agricultural yields, farmers could reduce poverty by increasing income as well as open up area for diversification of crops for household use. The World Bank itself claims to be part of the solution to malnutrition, asserting that the best way for countries to succeed in breaking the cycle of poverty and malnutrition is to build export-led economies that will give them the financial means to buy foodstuffs on the world market.

ii. Fortified foods

Manufacturers are trying to fortify everyday foods with micronutrients that can be sold to consumers such as wheat flour for Beladi bread in Egypt or fish sauce in Vietnam and the iodization of salt. For example, flour has been fortified with iron, zinc, vitamin A, folic acid and other B vitamins such as thiamine, riboflavin, niacin and vitamin B 12.

iii. Restricting population growth

Restricting population size is a proposed solution. Thomas Malthus argued that population growth could be controlled by natural disasters and voluntary limits through "moral restraint. Robert Chapman suggests that an intervention through government

policies is a necessary ingredient of curtailing global population growth (Wikipedia, 2015). However, there are many who believe that the world has more than enough resources to sustain its population. Instead, these theorists point to unequal distribution of resources and under- or unutilized arable land as the cause for malnutrition problems. For example, Amartya Sen advocates that, "no matter how a famine is caused, methods of breaking it call for a large supply of food in the public distribution system. This applies not only to organizing rationing and control, but also to undertaking work programs and other methods of increasing purchasing power for those hit by shifts in exchange entitlements in a general inflationary situation.

iv. Food sovereignty

One suggested policy framework to resolve access issues is termed food sovereignty the right of peoples to define their own food, agriculture, livestock, and fisheries systems, in contrast to having food largely subjected to international market forces. Food first is one of the primary think tanks working to build support for food sovereignty. Neoliberals advocate for an increasing role of the free market

v. Health facilities

Another possible long term solution would be to increase access to health facilities to rural parts of the world. These facilities could monitor undernourished children, act as supplemental food distribution centers, and provide education on dietary needs. These types of facilities have already proven very successful in countries such as Peru and Ghana.

vi Global initiatives

In April 2012, the Food Assistance Convention was signed, the world's first legally binding international agreement on food aid. The May 2012 Copenhagen Consensus recommended that efforts to combat hunger and malnutrition should be the first priority for politicians and private sector philanthropists looking to maximize the effectiveness

of aid spending. They put this ahead of other priorities, like the fight against malaria and AIDS.

The main global policy to reduce hunger and poverty are the Sustainable Development Goals. In particular Goal 2: Zero hunger sets globally agreed targets to end hunger, achieve food security and improved nutrition and promote sustainable agriculture. The partnership Compact 2025, led by IFPRI with the involvement of UN organizations, NGOs and private foundations develops and disseminates evidence-based advice to politicians and other decision-makers aimed at ending hunger and under nutrition in the coming 10 years, by 2025 (Grover and Looi, 2009).

2.14 Cause and Diseases of some Micronutrients

2.14.1 Iron deficiency anemia

Iron deficiency anemia is a common type of anemia, a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body's tissues. As the name implies, iron deficiency anemia is due to insufficient iron. Without enough iron, the body cannot produce enough of a substance in red blood cells that enables them to carry oxygen (hemoglobin) (ASH, 2016).

Causes of iron deficiency anemia

Iron deficiency anemia occurs when the body does not have enough iron to produce hemoglobin. Hemoglobin is the part of red blood cells that gives blood its red color and enables the red blood cells to carry oxygenated blood throughout the body (ASH, 2016). Causes of iron deficiency anemia include:

i. Blood loss; Blood contains iron within red blood cells. So if the body lose blood, it lose some iron. Women with heavy periods are at risk of iron deficiency anemia because they lose blood during menstruation. Slow, chronic blood loss within the

body such as from a peptic ulcer, a hiatal hernia, a colon polyp or colorectal cancer can cause iron deficiency anemia. Gastrointestinal bleeding can result from regular use of some over-the-counter pain relievers, especially aspirin.

ii. A lack of iron in the diet; the body regularly received iron from the foods taken. If the foods consume have little iron, over time the body can become iron deficient. Examples of iron-rich foods include meat, eggs, leafy green vegetables and iron-fortified foods. For proper growth and development, infants and children need iron from their diets.

iii. An inability to absorb iron; Iron from food is absorbed into your bloodstream in your small intestine. An intestinal disorder, such as celiac disease, which affects the intestine's ability to absorb nutrients from digested food, can lead to iron deficiency anemia. If part of the small intestine has been bypassed or removed surgically, that may affect the ability of the body to absorb iron and other nutrients.

iv. Pregnancy, without iron supplementation, iron deficiency anemia occurs in many pregnant women because their iron stores need to serve their own increased blood volume as well as be a source of hemoglobin for the growing fetus.

Diseases of iron deficiency anemia

Mild iron deficiency anemia usually doesn't cause complications. However, left untreated, iron deficiency anemia can become severe and lead to health problems (ASH, 2016). Including the following:

i. Heart disease; Iron deficiency anemia may lead to a rapid or irregular heartbeat. The heart must pump more blood to compensate for the lack of oxygen carried in the blood. This can lead to an enlarged heart or heart failure.

ii. Problems during pregnancy. In pregnant women, severe iron deficiency anemia has been linked to premature births and low birth weight babies. But the condition is preventable in pregnant women who receive iron supplements as part of their prenatal care.

iii. Growth problems. In infants and children, severe iron deficiency can lead to anemia as well as delayed growth and development. Additionally, iron deficiency anemia is associated with an increased susceptibility to infections.

2.14.2 Zinc deficiency

Zinc deficiency is referred to insufficient zinc to meet the needs of the body, or as a serum zinc level below the normal range. However, since a decrease in the serum concentration is only detectable after long-term or severe depletion, serum zinc is not a reliable biomarker for zinc status (Hess, et, al., 2007.

Causes of zinc deficiency

Zinc deficiency in humans is caused by reduced dietary intake, inadequate absorption, increased loss, or increased body system use. The most common cause is reduced dietary intake. In the U.S., the Recommended Dietary Allowance (RDA) is 8 mg/day for women and 11 mg/day for men (DRI, 2017). The highest concentration of dietary zinc is found in oysters, meat, beans, and nuts. Increasing the amount of zinc in the soil and thus in crops and animals is an effective preventive measure. Zinc deficiency may affect up to 2 billion people worldwide (Prasad, 2012).

Diseases of zinc deficiency

Zinc deficiency in children causes impaired growth, impaired taste (hypogeusia), delayed sexual maturation, and hypogonadism. In children or adults, manifestations also

include alopecia, impaired immunity, anorexia, dermatitis, night blindness, anemia, lethargy, and impaired wound healing (Prasad, 2012).

2.15 Management of Malnutrition

Management of malnutrition focuses on the correction of specific nutrient deficiencies (dietary management), treatment of complications and supper-imposed infections. WHO has formulated a three-phase management approach, where the patient initially is resuscitated and stabilized (phase 1), before starting nutritional rehabilitation (phase 2), and eventually follow-up and recurrence prevention (phase 3) (WHO, 2010).

i. Acute stabilization phase

The main aim during this phase is to resuscitate, rehydrate, treat infections, prevent sepsis, and monitor closely to avoid developing complications of treatment. Patients are most vulnerable during this period, which usually lasts about 1 week. Feeding should be instituted carefully and slowly, with restriction of caloric intake to 60% to 80% of caloric requirement for age. This is to avoid refeeding syndrome, but many severely malnourished children also have some degree of malabsorption because of disaccharidase deficiencies, villous atrophy, and relative pancreatic insufficiency. Continuous nasogastric feeding or small frequent meals including at night may be necessary to avoid hypoglycemia (WHO and UNICEF, 2011). Vitamins, especially thiamine and oral phosphate, also are administered, in addition to supplemental feeds to prevent the potentially fatal hypophosphatemia with refeeding. During this phase, patients also should be kept warm, as they are often hypothermic and may need restriction of physical activities because of decreased cardiac output. Antibiotics additionally may be necessary even in the absence of fever if infection is suspected (Birch, 1999).

ii. Nutritional rehabilitation phase

The rehabilitation phase starts once acute complications have been addressed adequately with gradual return of appetite, resolution of diarrhea and sepsis, and correction of electrolyte imbalances. The main goals of this phase are to increase dietary caloric intake, treat occult infections, complete vaccination, improve family involvement, and stimulate psychomotor activity. Weight loss is common initially in children with kwashiorkor as their edema resolves. Most children will need 120% to 140% of their estimated caloric requirements to achieve desired weight gain and maintain catch-up growth. This phase usually lasts between 2 to 6 weeks. WHO recommends delaying iron therapy until rehabilitation occurs because of concerns about increased infection risk, although a recent review does not support this practice. Elemental iron 2 to 6 mg/kg should be prescribed for 3 months (WHO, 2017).

iii. Follow-up and reoccurrence prevention

Discharge planning and follow-up are recommended, as these patients have tendency to relapse. Interventions that have been reported to be helpful in preventing undernutrition in children include promoting breast-feeding, complementary and supplemental feeding, zinc and vitamin A supplementation, universal salt iodization, and hand washing and other hygiene measures.

2.16 Infant and Young Child Feeding Practices

According to WHO and UNICEF Children between the ages of 0-23 months formed the basis of establishing breast feeding practices (WHO and UNICEF, 2010). The variables of interest, based on WHO (2007) indicators of breastfeeding practices were; early initiation of breastfeeding in children 0-23 months; exclusive breastfeeding for infants under six months old, continued breastfeeding at 1 year (12-15 months of age) and continued breastfeeding at 2 years (20-24 months old) (UNICEF, 2011). Appropriate

infant and young child feeding is a combination of how, when, and what children 0-23 months old should be fed (Pelto, *et, al.,* 2003). The WHO and UNICEF recommend that children should be exclusively breastfed for 6 months, after which nutritiously appropriate, adequate, and safe complementary foods should be introduced along with continued breastfeeding up to 2 years and beyond (WHO and UNICEF., 2008).

The WHO recommends minimum meal frequency for children between 6-23 months old as; 2 times a day for breastfed children between 6-8 months old increasing to 3 times for breastfed children between 9-23 months old. Non-breastfed children between 6-23 months old should be fed on minimum 4 times a day. In all the cases additional 1-2 nutritious snacks should be included (WHO, 2008).

CHAPTER THREE

3.0 Materials and Methods

3.1 Materials

3.1.1 Chemical and reagents

The chemical and reagents (nitric acid and hydrochloric acid) used for this study is of analytical grade and were obtained from a standard chemical store in Kaduna State.

3.1.2 Equipment

The equipment used for this study included electronic digital weighing balance, sample MUAC tape, infantometer/standiometer, validate semi structured questionnaires, writing materials, test tube, 2ml sterile syringe, haemoglobin (Hb) test strip, haemoglobin meter, micro pipette, beakers, atomic absorption spectrophotometer and ED224S Sartorius analytical balance.

3.1.2 Blood sample collection

Blood sample were collected using standard procedures as described by (Oguizu, 2015). Two millimetres (2ml) of blood per child was collected using sterile syringe and was then transferred into ethylene ditetra acetic acid kits (EDTA kits). The blood samples collected were centrifuge at 3000 rpm for 5 min (Bahi, 2017) and the plasma collected in sample kits was stored at (20 °C) until analysis.

3.2 Methods

3.2.1 Blood sample preparation

Blood samples collected from the children were used for laboratory analysis using haemoglobin meter and atomic absorption spectrophotometer (AAS). Atomic absorption spectrophotometer is spectroanalytical procedure for the quantitative

determination of chemical elements using absorption of optical radiation by the free elements in the gaseous state. The clear supernatant collected from the cooled digested sample was inserted directed into atomic absorption spectrophotometer at wavelength of 324.8nm and a single element standard solution 1000mg/L diluted at 1/500 with nitric acid-deionized water (0.5 M) was used to prepared the calibration range.

3.2.2 Study area

Zaria is a local government council in Kaduna State, northern Nigeria, with it's headquarter in Zaria city, as well as a larger city in Kaduna State (Ahmad, *et, al.*, 2010). In 11^{th} century, King Gunguma founded it as one of the original Hausa Bakwai (seven True Hausa State). Zaria remains, however, one of the Nigeria largest (about 12, 750 sq mi [33,000 sq km]) traditional emirates. It's a savannah area, one of the nation leading producers of cotton for export. Other significant cash crops include tobacco, peanuts (groundnuts), soybeans, sugarcane etc.

The population is an ethnic mix in which Msulim Hausa and Fulani people predominate. It is bordered Sabo Gari local government to the west, Soba Gari local government to the east, Igabi local government to the north and Igabi local government to the south. It's made of political area wards: Kaura, Kwarbai, Tudun wada, Tukur-Tukur, Gambo, Dutsen Abba, Gyallesu, Kufena, Kwarbai a, Kwarbai b, Limancin Kona, Ung. Fatika, Ung. Juma and Wucicciri wards. It has a projected population of 1,020,577 in 2021 if the growth rate of 0.91% seen from 2006 to 2015 is maintained (Wikipedia, 2021). It's one of the local governments supported by the State government, through Kaduna Emergency Nutrition Action Plan (KADENAP) in collaboration with UNICEF to address the infant and young child feeding problem at a community level, since the starting time of the programme in March 2014 (UNICEF, 2014).

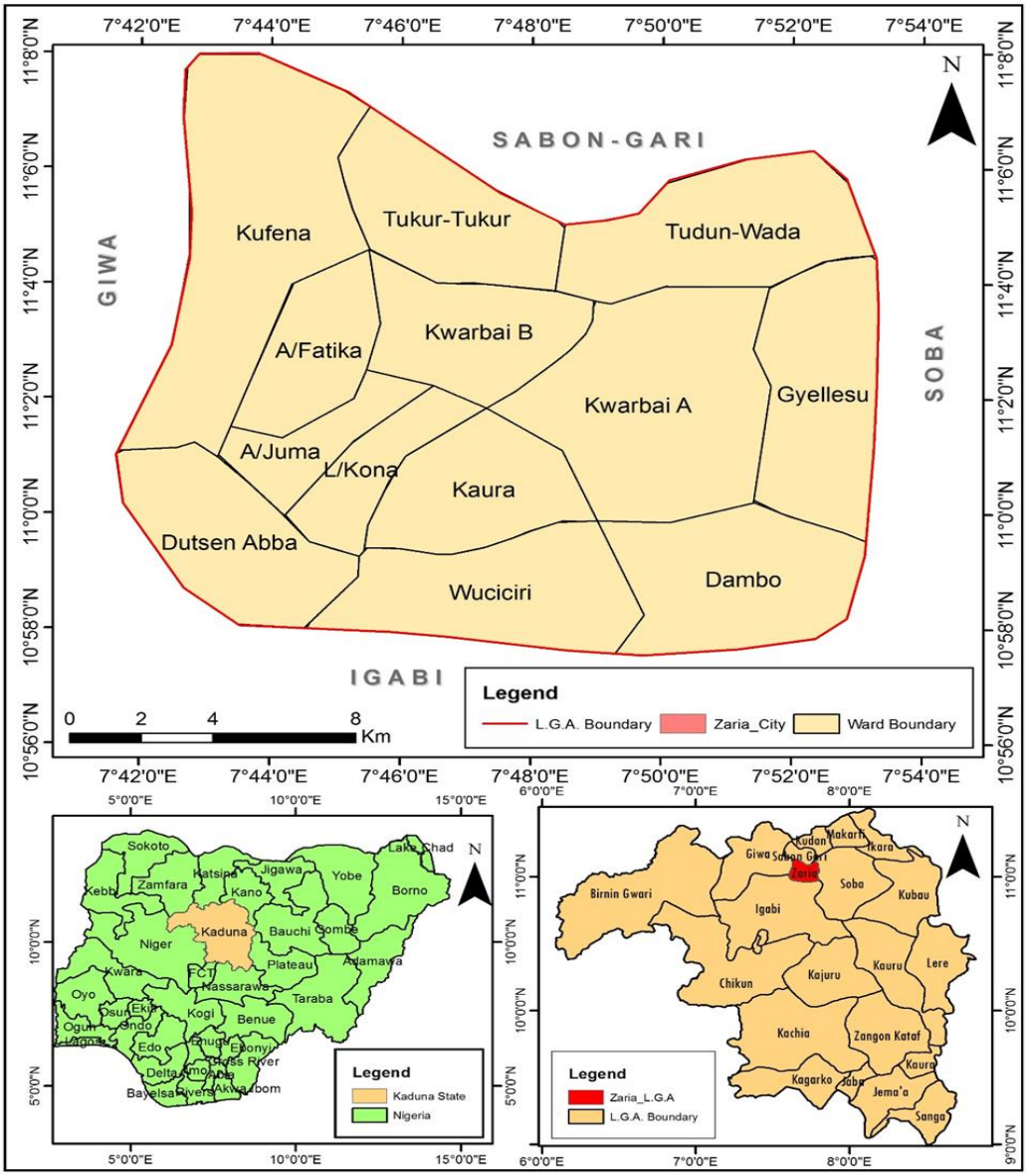


Figure 3.1: Map of Zaria Local Government of Kaduna State.

3.2.3 Study design

This study is a clinic/community based cross-sectional survey. The anthropometric indices (weight/length for age, length for age, weight for age and MAUC) of children (0-23months) were taken to assess nutritional status. The dietary diversity scores were used to assess nutrient intake of the children. Core indicators and minor indicators was used to assess infant and young child feeding practices.

The dietary pattern of breast feeding, complementary feeding practice and community infant and young child feeding (C-IYCF) programme were later compared to the national guideline as standard. Biochemical analysis was assessed using haemoglobin, serum zinc and serum iron to determine the nutritional status of the children. Community infant and young child feeding (C-IYCF) programme was assessed using semi structure questionnaire.

3.2.4 Study population

The sampling frame included children (0-23months) in Zaria Local Government, caregivers and primary health workers involved in community infant and young child feeding (IYCF) programme in Zaria local government area of Kaduna State.

Inclusion criteria.

The study was comprising of all children (0-23months) enrolled for care, and caregivers of the children (0-23 months) who have counselled in the selected communities/primary health care (Babban dodo PHC, Rafin Magaji PHC and Wucciccir PHC) in Zaria local government.

Exclusion criteria.

Children whose age is above 2 years, caregivers/children outside the study LGA and children who could not stand erect due to deformity were excluded from this study.

Ethical approval and informed consent

Ethical approval was obtained from the ethical committee of Ahmadu Bello University, Zaria and Kaduna State ministry of health with verbal approval. A written permission was collected from Zaria local government primary healthcare agency (PHCA). A duly approved informed consent were obtained from the caregivers (Appendix I).

3.2.5 Sample size determination

A multiple stage sampling method was used which include convenience sampling method, stratified sampling method and simple random sampling technique. The convenience sampling was used to determine the study population based on the number of the caregiver's/children pairs at the hospital facility during the period of the study. Stratified sampling method was used to divide population area into three strata while one ward was selected from each stratum.

Simple random sampling technique was used to determine the equal sample size by chosen the caregivers/children using a random number table from a complete list of caregivers/children attending IYCF programme in the selected communities/primary health centres in the LGA.

3.2.6 Sample size calculation

Sample size was calculated using conventional formula as described by WHO, 2010).

$$n = \frac{z^2 pq}{d^2}$$

Where:

n = the desire sample size

z= the standard normal deviate usually set at 1.96 (which corresponds to the 95% confidence level)

p= the prevalence of malnutrition in the target population (11.7% prevalence of wasting in Multiple Indicators Cluster Survey (MICS) conducted in Kaduna in 2018)

q= 1-p

d= absolute precision or accuracy, normally set at 0.05.

$$n = \frac{(1.96)^2(0.117)(0.883)}{(0.05)^2}$$

$$n = \frac{(3.8416)(0.117)(0.883)}{(0.0025)}$$

= 159

3.2.7 Sampling method

There are five IYCF centres in Zaria LGA, these are: Babban dodo in Limancin Kona ward, Rafin Magaji in Kufena ward, Ung. Fatika, Wucicciri and Dutsen Abba. The IYCF centres were divided into three strata: The western ward (Rafin Magaji and Dutsen Abba), Central ward (Babban dodo and Unguwan Fatika) and Eastern ward (Wucicciri) parts of the local government area.

One centre was selected randomly from each stratum, therefore 3 IYCF centres was used for this study. 159 caregivers/children were selected randomly, 53 was from Rafin magaji ward, 53 from Babban dodo ward and 53 from wucicciri ward.

3.4 Field Data Collection

Socio-demographic characteristics of the children were assessed using validated semi-structured questionnaires which was administered through semi-structured interviews and was conducted by a trained interviewer.

3.5 Determination of Anthropometric Indices

3.5.1 Length measurements for children below 2 years of age

For infants and children below two years of age, who could not stand, length was measured by making the child lay on a flat surface, head positioned firmly against the fixed hardboard, with the eyes looking vertically. The knees extended by applying firm pressure and feet are flexed at right angles to the lower legs on the board. Length was measured between the two boards to the nearest 0.1cm.

3.5.2 Measurements of anthropometric indices

Measurements of Weight and MUAC was obtained according to the guidelines described in the Food and Nutrition Technical Assistance (FANTA) Guide (Cogill, 2003). All weight and length measurements were carried out in triplicate and the average obtained in order to minimize errors during the measurement.

3.6 Procedures of Anthropometric Measurement

i. Weight

The weight measurement was conducted with the aid of an electronic digital weighing scale to the nearest 0.1kg, with minimal clothing and no shoes and standardization.

ii. MUAC

Mid upper arm circumference was measured by bending left arm at right angle, tip of shoulder and elbow were located, distance between the two points was measured to obtain the midpoint, with the arms relaxed, MUAC tape is wrapped around the midpoint and were measured and colour coded was noted.

iii. Age of the children

Age of the children was obtained from the caregivers through birth certificate or land mark.

3.7 IYCF Practices

Food diversity of the children were determined to get the types of foods, beverages, and also to know the breast feeding and complementary feeding practice adopted within the previous day and as the child is growing using semi structure questionnaire (Appendix III).

i. Minimum meal frequency

The indicator (minimum meal frequency) was calculated from the following fraction (WHO, 2010):

$$\frac{\text{(Breastfed children 6-23.9 months of age who received solid, semi-solid or soft foods in the minimum number of times or more during the previous day)}}{\text{Total Breastfed children 6-23.9 months of age}}$$

ii. Minimum dietary diversity

The 8 foods groups used for tabulation of this indicator (Minimum dietary diversity) are: -Grains, roots and tubers, legumes and nuts, milk and products (breast milk, yogurt, and cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin-A rich fruits and vegetables and other fruits and vegetables.

iii. Minimum acceptable diet

This composite indicator (Minimum acceptable diet) was calculated from the following two fractions (WHO, 2010):

$$\frac{\text{Breastfed children 6-23.9 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Breastfed children 6-23.9 months of age}}$$

$$\frac{\text{Non-breastfed children 6-23.9 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Non-breastfed children 6-23.9 months of age}}$$

3.8 Biochemical Parameters

i. Haemoglobin

Haemoglobin was measured using haemoglobin metre. Test strip were inserted into the strip channel in the same direction as the arrows indicated on the strip. Approximately 10µL of blood was collected from EDTA kits using micro pipette and were applied to the specimen application area of the test strip. The haemoglobin was taken from the haemoglobin meter within 15 seconds and recorded. The experimental value was compared with the reference value of 11.0-14.0g/dl as described by Aconlab. (2017).

ii. Plasma iron and Plasma zinc

The serum iron and zinc measurement were carried out using an atomic absorption spectrometer (AAS) (Pinta, 1980). Deionized water was used throughout this study. All glassware was soaked in 5% (v/v) HNO_3 overnight which were then rinsed with deionised water and dried using lab dryer Sanyo MIR-162.

The blood sample was subjected to acid digestion methods, (Nitric hydrochloric acid digestion 3:1). 0.5g each of the sample was accurately weighed, 7.5ml of 65% HNO_3 and 2.5ml of 30% HCL were added, and then the mixture was heated for 4hrs at 120^{o}c and was allowed to cool. Twenty millimetre of deionized water were added, stirred, washed and filtered using Whatman 1 filter paper, then, a sufficient amount of deionized water was added to make up the final volume of 50ml in the volumetric flask. (UNICEF, 2007).

After homogenization according to the method of Banjoko, each sample was allowed to settle. The clear supernatant obtained was used for atomic absorption spectrophotometer analysis at the wavelength of 324.8 nm for the iron and zinc, respectively (Banjoko, *et, al.,* 2012). A single element standard solution of 1000mg/L diluted at 1/500 with nitric acid-deionized water (0.5 M) was used to prepared the calibration range (0; 5, 10 and 15

mg/L) of iron and (0, 1, 2, and 3 mg/L) of Zinc. The concentration measurements were obtained in triplicate. The experimental value was compared with the standard values of >400-500mg/L and 11.5–18.5 mg/L for serum iron, and zinc (FAO and WHO, 1988, Mobaien, *et, al.,* 2012).

3.9 Evaluation of the Programme

The evaluation of the quality of community infant and young child feeding programme was carried out using semi structured questionnaire (Appendix II), which were targeted to primary health workers in selected strata in primary health centres of Zaria LGA. Some of the keys Community IYCF that measured the quality of the community infant and young children include: Active and Sustainable Baby-Friendly Hospital Initiative, Mother-Friendly Child birth Strategies, Health Care Providers (pre-service) Education, In-Service training for Health care providers, Community Outreach and Support and Information on education and communication. The strength or quality of the community infant and young child feeding programme was determine using the IYCF action score and rating keys as (WHO, 2010):

Scores	Rating
0 – 3	Poor (very low number of the key IYCF actions or interventions implemented)
4 – 6	Fair (low number of the key IYCF actions or interventions implemented)
7 – 8	Good (average number of the key IYCF actions or interventions implemented)
9 – 10	Very good (high number or all of the key IYCF actions or interventions implemented)

3.10 Data Analysis

Data obtained were analysed using SPSS version 20. Data was presented as mean ±SD. Descriptive statistics was used to summarised data obtained on socio-demographic characteristics and chi-square test were used for categorical variables. Anthro. Software was used to analyse anthropometry indices.

IYCF practices questionnaires was coded and analysed, frequencies and percentage for various responses were generated to describe caregiver's practices using SPSS version 20.

CHAPTER FOUR

4.0 Results

4.1 Socio Demographic Characteristics of Caregivers of Under 2 Children in Zaria Local Government, of Kaduna State

Table 4.1 describes the demographic characteristics of the study population. The survey was conducted among 159 caregivers of the children attending the community infant and young child feeding programme in Zaria LGA of Kaduna State. The mean age of the caregivers that participated in this study was 27±8 with most (31.8%, n=48) being between the ages 15 - 20 years, 42(26.9%) between 21 - 25 years, 33(20.6%) between 26 - 30 years, 20(10.5%) between 31 - 40 years, 8(5.1%) between 31 - 40 years and just 8(5.1%) were below 15 years. For marital status almost all (96.2%, n=153) of the mothers were married, those who were divorced were 4 (2.5%) and only 1 each of the mothers reported to be single and being widowed.

The majority (47.8%, n=77) of the study population were not educated as they all responded to “None” as their educational status. However, had attended primary school or were in primary school (30.2%, n=48), 29(18.2%) attended secondary school, 4(2.5%) attended vocational studies and only 1(0.6%) each had attained post-secondary school and technical education. The main occupation of the caregivers was farming (48.4%, n=77), followed by business with 70(44.0%) respondents. Only a very small proportion 10(6.3%) of the caregivers were civil servants while 2(1.3%) had other types of occupation. The amount earn per month by the caregivers, showed that 61(38.4%) earns between 5,000 - 10,000 naira monthly, 46(28.9%) earns 11,000 - 20,000 naira monthly while 20(12.6%) each earns below 5,000 naira and between 21,000 - 50,000 naira, only about 12(7.5%) earns 51,000 - 100,000 naira with none of the caregivers

earning above 100,000 naira monthly (table 4.1). Regarding total number of people in a household, almost half 63(44.7%) of the caregivers responded to 6 – 10 people in a household, while 38(23.9%), 31(19.5%), 19(6.9%) and 8(5%) responded to between 1 – 5, 11 – 15, 16 – 20 and above 20 people in a household respectively (Table 4.1).

4.1.1 Sex and age distribution of children (0-23months) accessing care in community infant and young child feeding program in Zaria LGA, of Kaduna State

Sex and Age distributions of the children are presented in Table 4.2. From the Table, male and female children were almost equally distributed with 80(50.3%) and 79(49.7%) respectively. Table also shows that 6(53.8%) of the 0 – 6 months' children in the study were females, while 7(46.2%) were males. Children age 7 – 12 months were almost evenly distributed with 46(51.1%) being males and 44(48.9%) females. About 11(61.1%) of the children 13 – 18 were females while 7(38.9%) males and lastly for the children between 19 – 23 months of age, 21(55.3%) were males and 17(44.7%) being females.

Table 4.1: Socio-Demographic Characteristics of Caregivers of Children (0-23months) Accessing Care in C- IYCF Program in Zaria LGA, of Kaduna State

Variables		Frequency	Percentage (%)
Age of Caregiver (Years)	Below 15	8	5.1
	15 - 20	48	31.8
	21 - 25	42	26.9
	26 - 30	33	20.6
	31 - 40	20	10.5
	Above 40	8	5.1
Marital Status of Caregiver	Single	1	0.6
	Married	153	96.2
	Divorce	4	2.5
	Widow	1	0.6
Educational Status of caregiver	Primary	48	30.2
	Secondary	29	18.2
	Vocational	4	2.5
	Technical	1	0.6
	Post-secondary	1	0.6
	None	76	47.8
Occupation of caregiver	Farmer	77	48.4
	Business	70	44.0
	Civil Servant	10	6.3
	Others	2	1.3
Average monthly income (N)	Below 5,000	20	12.6
	5,000 - 10,000	61	38.4
	11,000 - 20,000	46	28.9
	21,000 - 50,000	20	12.6
	51,000 - 100,000	12	7.5
	Above 100,000	0	0.0
Household size	1 - 5	38	23.9
	6 - 10	71	44.7
	11 - 15	31	19.5
	16 - 20	11	6.9
	Above 20	8	5.0

Table 4.2: Age and Sex Distribution of Children (0-23months) accessing care in Community Infant and Young Child Feeding Program in Zaria LGA, of Kaduna State

Variables		Sex of Child		
		Male	Female	Total
		n (%)	n(%)	N
Age of Children	0- 6 months	6(46.2)	7(53.8)	13.0
	7 - 12 months	46(51.1)	44(48.9)	90.0
	13 - 18 months	7(38.9)	11(61.1)	18.0
	19 - 23 months	21(55.3)	17(44.7)	38.0

4.2 Nutritional Status of Children

4.2.1 Anthropometry measurement (weight, length and MUAC) of children (0-23months) accessing care in community infant and young child feeding program in Zaria LGA, of Kaduna State

Table 4.3 present the mean and standard deviation of the weight, length and the MUAC reading of the participated children (0-23months). From the table the mean weight (4.4±1.1, 5.9±1.1, 6.8±1.2 and 7.2±1.3), length (52.4±5.1, 58.7±6.8, 62.8±4.9 and 69.1±4.6) and MUAC (9.8±0.7, 10.3±1.2, 10.5±0.9 and 11.0±0.7) respectively.

Anthropometric indices

Anthropometry tools, Mid Upper Arm Circumference (MUAC), Weight for length (WLZ), Weight for age (WAZ), and length for age (LAZ) were used to assess the level of malnourishment, wasting, underweight and stunting respectively among the children in the study population.

The nutritional status of the children as presented in Table 4.4, shows that in total 145(91.7%) of the children were severely malnourished and about 14(8.3%) were moderately malnourished. For nutritional status WLZ (wasting), majority (76.1%, n=121) of the children were normal, others 24(15.1%) were severely wasted while the remaining 14(8.8%) were moderately wasted. Whereas, the nutritional status WAZ (underweight) showed that Most (68.6%, n=109) of the children were severely underweight and considerable number of about 31(19.5%) and 19(11.9%) were moderately and normal respectively.

Length for age (LAZ) was used to measures chronic malnutrition in the children. As shown in the result almost all the children (91.1%, n=144) were severely stunted only about 12(7.6%) and 2(1.3%) of them were moderately and normal.

4.2.3 Association between socio-demographic characteristics and nutritional status of children (0-23months) accessing care in C-IYCF program in Zaria, LGA of Kaduna State

The association between the socio-demographic characteristics and mid upper arm circumference (MUAC) did not show any significant relationship as all the p-values were >0.05 statistically significant level.

Table 4.5 present the Association between Socio-Demographic Characteristics and WHZ. Amount earned monthly by the caregivers was the only socio-demographic variable that was significantly associated with weight for length Z-scores of the children (chi-square=19.450, p-value 0.0048). This revealed that the children belonging to the mothers earning below 5,000 naira (30.0%) monthly were more likely to become severely wasted than those from mothers that earns between 51,000 - 100,000 naira (25%).

The association between Socio-Demographic Characteristics and LAZ. As shown in the table, the ward of the participants was the only socio-demographic variable that was significantly associated with the nutritional status length for age (LAZ) (chi-square =11.2560, p-value=0.021). From the relationship, children from Wucuciri were more likely to become severely stunted (100%), followed by children from Baban Dodo (90.6%) than the children from Rafin Magaji with severe level at (82.7%). Moderate stunting was more in Rafin Magaji (13.5%), followed by Baban Dodo (9.4%). All other variables were not significant as their p-values were >0.05 significant level (Table 4.5).

Association between Nutritional Status and Sex of Child

The Association between Nutritional Status (MUAC, WLZ, WAZ and LAZ) and Sex of Child is presented. From the Table Weight for Age (WAZ) was significantly related to

the sex of the children. The significant portion who are severely underweight (54.1%) were male while female was significantly more likely to become moderately underweight (71%) while males were more likely to become mildly underweight (60%) (Chi-square=7.789, p-value=0.050).

The association between the sex of the children and the Mid-Upper Arm Circumference (MUAC) was not statistically significant (X^2= 0.880, p = 0.644), so also with WLZ (X^2= 0.170, p = 0.982) and LAZ (X^2= 3.420, p = 0.181) as all their p values were greater than the 0.05 statistically significant level (Table 4.5).

4.3.3 Types of food consumed by the children (0-23 months) accessing care in C-IYCF program in Zaria, LGA of Kaduna State

According to Figure 4.1 which present the food consumed by the children, legumes, nuts and seed were the most (62.7%) consumed foods by the children followed by Cereals which was consumed by (60.8%). Consumption of meat was done by 55.1% children, milk and milk product by 45.6% and beverages by 32.9%. Eggs, vitamin rich fruits were consumed by 32.3% and 23.4% respectively while sweets and vitamin rich vegetables were consumed by 19% and 13.9% of the children respectively.

Table 4.3: Anthropometric Measurement (Weight, length and MUAC) of Children (0-23months) Accessing care in Community Infant and Young Child Feeding Program in Zaria LGA of Kaduna State

Anthropometric indices	Age of Children months			
	0 – 6	7 – 12	13 – 18	19 – 23
	Mean±Std	Mean±Std	Mean±Std	Mean±Std
Weight(kg)	4.4±1.1	5.9±1.1	6.8±1.2	7.2±1.3
Length (cm)	52.4±5.1	58.7±6.8	62.8±4.9	69.1±4.6
MUAC (cm)	9.8±0.7	10.3±1.2	10.5±0.9	11.0±0.7

Table 4.4: Nutritional Status of Children (0-23 months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

	Anthropometry Indices		
		Frequency	%
MUAC	Normal (>12.5cm)	2	1.3
	Moderate malnutrition (>1 1.5cm<12.5cm)	12	7.0
	Severe malnutrition (<1 1 .5cm)	145	91.7
WLZ	Normal (<-l Z-scores>-2 Z-scores)	121	76.1
	Moderate Wasting (>-3 Z-scores<-2 Z-scores)	14	8.8
	Severe Wasting (<-3 Z-scores)	24	15.1
WAZ	Normal (<-l Z-scores>-2 Z-scores)	19	11.9
	Moderate Underweight (>-3 Z-scores<-2 Z-scores)	31	19.5
	Severe Underweight (<-3 Z-scores)	109	68.6
LAZ	Normal (<-l Z-scores>-2 Z-scores)	2	1.3
	Moderate Stunting (>-3 Z-scores<-2 Z-scores)	13	7.6
	Severe Stunting (<-3 Z-scores)	144	91.1

MUAC= Mid Upper Arm Circumference, WLZ=Weight for length for age, WAZ= Weight for age, LAZ= Length for age

Table 4.5: Association Between Socio-Demographic Characteristics and Nutritional Status of Children (0-23 months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

						Chi-Square	
		N	%	N	%	X	P-value
Amount earn per month of Caregiver/ WLZ	Below ₦ 5,000	5.0	5.0	30.0	***19.450***	***0.644***	***0.048****
	₦ 5,000 - ₦ 10,000	19.7	13.1	9.8			
	Severe Wasting (<-3 Z-scores)	13	54.2	11	45.8		
WAZ/Sex of children	Normal (>-2 Z-scores <-1 Z-scores)	12	75.0	7	25.0	***7.789***	***0.050****
	Moderate Underweight (>-3 Z-scores<-2 Z-scores)	9	29.0	22	71.0		
	Severe Underweight (<-3 Z-scores)	59	54.1	50	45.9		
Ward/LAZ	Rafin Magaji	3.8	13.5	82.7	***11.560***	***0.021****	
	Baban Dodo	0.0	9.4	90.6			
	Wuciciri	0.0	0.0	100.0			

The Chi-square statistic is significant at the .05 level.

MUAC= Mid Upper Arm Circumference, WLZ=Weight for length for age, WAZ= Weight for age, LAZ= Length for age

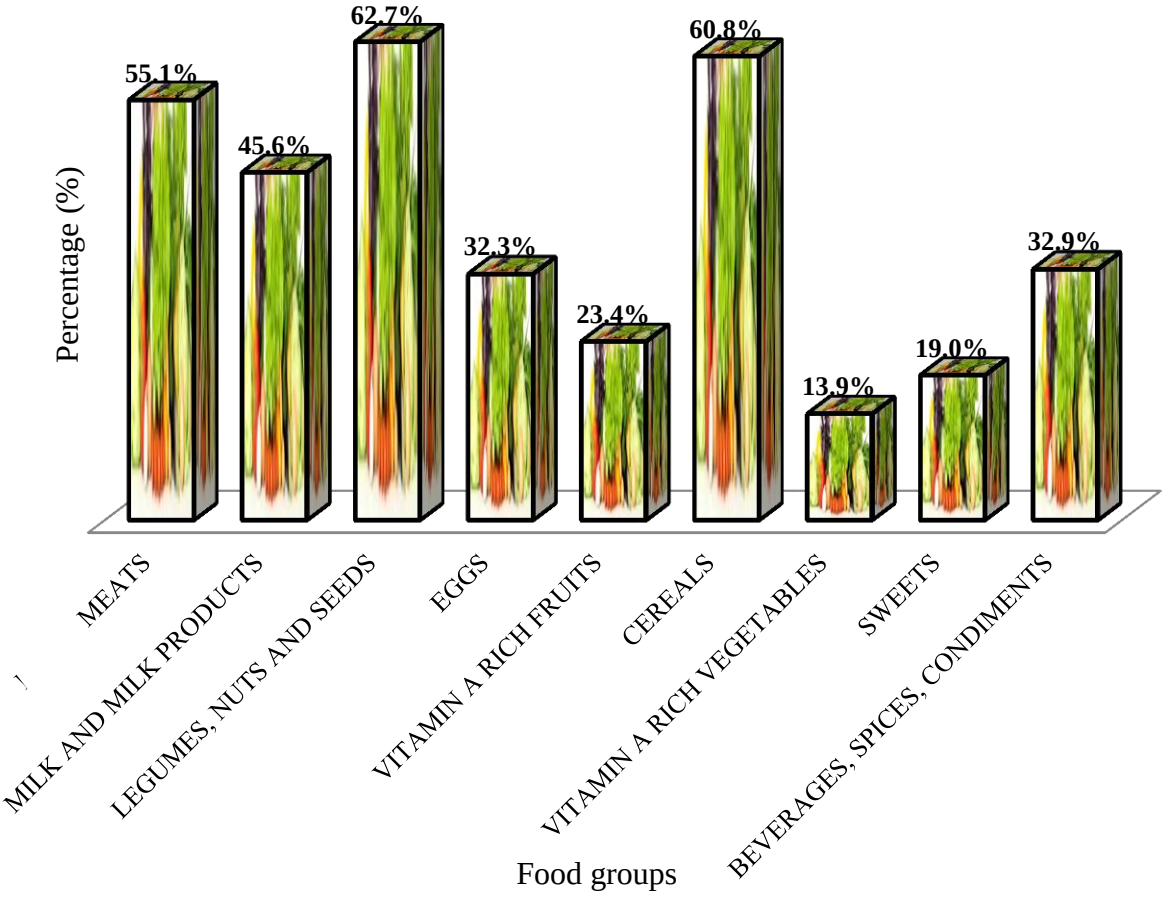


Figure 4.1 Types of Food Consumed by the Children (6-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

4.3 Infant and Young Child Feeding Practices among the Caregiver of Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

4.3.1 Breastfeeding practices

The result for the breastfeeding practices is presented below in Table 4.7. As shown in the Table, exclusive breastfeeding was practice by only 13(8.2%) mothers out of the 159 in the study population. Majority (74.8%) of these children were still breastfeeding at the time of study but out of these children only few of about 35(22%) were initiated to the breast within one hour of birth (Early initiation of breastfeeding) as recommended by WHO and UNICEF that breastfeeding should be initiated within the first hour of birth (WHO and UNICEF, 2003). Whereas majority (91.7%, n=112) responded to breast feeding on demand with a small proportion of 5(4.1%) and 4(3.3%) responded to breastfeeding When Convenient and breastfeeding at a Schedule time respectively.

Concerning breastfeeding, infant and young child feeding practices was applied to know their breastfeeding practices. About 106(66.7%) of the mothers responded to have breastfed yesterday during the day or at night and about 100 (62.9%) reported to have given vitamin drops or other medicines as drops yesterday during the day or at night (Table 4.6).

4.3.2 Complementary Feeding Practices (not exclusively breastfed) among the Caregivers of Children (0-23months) Involved C-IYCF Program in Zaria, LGA of Kaduna State

In this study almost all (91.8%, n=146) of the women had introduce solid food to their children before 6 months (Table 4.6).

Table 4.6: Infant and Young Child Feeding Practices among the Caregiver of Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

Variables		Frequency	Percentage (%)
Exclusive Breastfeeding	Yes	13	8.2
	No	146	91.8
Breastfed		119	74.8
Non-breastfed		40	25.2
Early initiation of breastfeeding	Yes	35	22.0
	No	124	78.0
Breastfeeding Regime (N=121)	On demand	112	70.6
	Schedule time	4	3.3
	When Convenient	43	26.1
Was this child breastfed yesterday during the day or at night?	Yes	106	66.7
	No	53	33.3
Was this child given any vitamin drops or other medicines as drops yesterday during the day or at night?	Yes	100	62.9
	No	59	37.1

4.3.4 Diet quality of children (6-23months) accessing care in C-IYCF program in Zaria, LGA of Kaduna State

i. Minimum meal frequency (MMF)

In this study, majority (75.5%) of the caregivers failed to meet the minimum meal frequency recommended, only about 24.5% met the UNICEF and WHO recommendation (WHO and UNICEF, 2008).

The association between minimum meal frequency and socio demographic characteristics as presented a significant association with age of child and Amount earn per month of Caregiver. The children 7 – 12 months (76.7%) were more likely (chi-square= 8.217, p-value = 0.042) not meeting minimum meal frequency than children 19 -24 and 13 – 18 months 73.7% and 55.6% respectively. Children from mothers with monthly earnings 5,000 – 10,000 naira (82%) and below 5,000 naira (80%), were more likely (chi-square=9.587, p-value=0.048) not to meet the minimum meal frequency, than the others who earns 21,000 – 50, 0000 naira (75%) and 11,000 – 20,000 naira (71.7%).Whereas minimum meal frequency and Nutritional status was not significantly associated with any variables (p-value>0.05) (Table 4.7).

ii. Minimum Dietary Diversity (MDD)

In this study almost all (89.9%) mothers did not meet the minimum dietary diversity as recommended by WHO and UNICEF, only 10.1% portion of the population met the minimum recommendation.

iii. Minimum Acceptable Diet (MAD)

In this study children who met minimum acceptable diet were close to half (47.5%) of the population.

Educational status of caregiver and social economic status of caregiver were the only socio-demographic characteristics that significantly associated with minimum dietary diversity. A significant portion of children from mothers who were technically educated (100%) were more likely (chi-square=20.909, p-value=0.001) to diversified their diet than children from mothers who had post-secondary education (0%), secondary (86.2%) and primary education (81.3%). Also significant portion of children from high (100%) social economic status was more likely (chi-square=9.408, p-value=0.009) to diversify their diet than middle (12.9%) and lower (8.7%) (Table 4.7).

The association between minimum acceptable diet and socio-demographic characteristics. In the Table, socio-economic status variable was the only socio-demographic variable having a statistical significant association with minimum acceptable diet. Significant portion of children from high (100%) social economic status was more likely (chi-square=4.672, p-value=0.047) to diversify their diet than lower (51.2%) economic and middle (32.3%) economic children.

Table 4.7 revealed that nutritional status WLZ was significantly associated with minimum acceptable diet. The significant portion of the children who did not met the minimum acceptable diet were more (chi-square= 11.073, p-value=0.011) to be severely (85.7%) and moderately (55.0%) wasted than those children who met (14.3%), and (45.0%) respectively.

Table 4.7: Association between Nutritional Status and Diet Quality of the Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

		Diet qualities			
		Met	Not-met	Chi-Square Test	
		%	%	X	P-Value
Age of Children/MMF	0 - 6 months	0.0	100.0	***8.217***	***0.042****
	7 - 12 months	23.3	76.7		
	13 - 18 months	44.4	55.6		
WAZ/MAD	Normal (>-2<-1 Z-scores)	44.0	56.0	***11.073***	***0.011****
	Moderate Wasting (>-3<-2 Z-scores)	14.3	85.7		
	Severe Wasting (<-3 Z-scores)	33.3	66.7		
Educational Status of caregiver/MDD	Primary	18.8	81.3	***20.909***	***0.001****
	Secondary	13.8	86.2		
	Vocational	25.0	75.0		
	Technical	100.0	0.0		
	Post-secondary	0.0	100.0		
Social economic status of Caregiver/MAD	Lower	51.2	48.8	***4.672***	***0.047****
	Middle	32.3	67.7		
	High	100.0	0.0		
WAZ/MAD	Normal (>-2<-1 Z-scores)	44.0	56.0	***11.073***	***0.011****
	Moderate Wasting (>-3<-2 Z-scores)	14.3	85.7		
	Severe Wasting (<-3 Z-scores)	33.3	66.7		

The Chi-square statistic is significant at the .05 level.

WLZ =Weight for length for age, MDD=Minimum dietary diversity, MAD=Minimum acceptable diet, MMF=Minimum meal frequency, WAZ=Weight for age, LAZ=Length for age

4.4 Biochemical Parameters (Serum Zinc, Iron, and Haemoglobin Level) of Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

Table 4.8 present the result of the biochemical parameters (Plasma zinc, Plasma iron and the haemoglobin level) of the children. The mean and standard deviation of Plasma zinc was 11.09±6.91 mg/l and a range of 2.60 – 30.60 while the mean and standard deviation of Plasma iron concentration was recorded as 320.49±106.78mg/l respectively, ranging from 201 – 564.4 mg/l. The Haemoglobin level of the children recorded a mean and standard deviation of 9.62±2.13 g/dl, and it ranges from 6.55 – 14.85 g/dl.

4.4.2 Association between age of children with plasma zinc, iron and haemoglobin level of children (0-23months) accessing care in C-IYCF program in Zaria, LGA of Kaduna State

Table 4.9 present the association between the child's age categories, and biochemical parameters (serum zinc, plasma, iron and the haemoglobin level). Plasma zinc and plasma iron from the test, showed non-statistically significant difference, because there is no statistical significance difference between the groups as their p-values were p=0.600 and p=0.666 respectively, all greater than the 0.05 statistically significant level.

Haemoglobin level which demonstrates p=0.018, showed statistically significant differences between the four age groups of the children. There was a statistically significant association ($p = 0.018$) between haemoglobin of the children and their age categories (0−6, 7−12, 13−18, and 19−24 months) at the $p < 0.05$ level of significance, as shown in Table 4.20. The children between the ages 7 -12 months who were normal (70.6%) were significantly higher than the other age groups while the children between

the ages 19 – 24 months had significant low (50%) haemoglobin level compare to others.

Table 4.8: Plasma Zinc, Plasma Iron, and Haemoglobin Level of Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State.

Parameters	Mean±std	Normal Range(mg/l/ g/dl)
Zinc (mg/l)	11.09±6.91	11.5–18
Iron (mg/l)	320.49±106.78	>400-500
Haemoglobin (g/dl)	9.62±2.13	11.0-14.0

Table 4.9: Association between Plasma Zinc, iron and Haemoglobin with Age of of Children (0-23months) Accessing Care in C-IYCF Program in Zaria, LGA of Kaduna State

		Age of Child			
		0 - 6 months	7 - 12 months	13 - 18 months	19 - 24 months
		%	**%**	**%**	**%**
Plasma Zinc	Normal	7.692	69.2	0.0	23.1
	Deficient	0.000	50.0	25.0	25.0
	Excess	0.000	50.0	25.0	25.0
	Mean±SD	6.400	11.42±7.72	6.70±1.9	10.42±5.24
	Range	6.4 - 6.4	3.10 - 30.60	0.00-17.50	4.70 _ 19.90
	p-value	***0.600***			
Plasma Iron	Normal	6.667	60.0	13.3	20.0
	Deficient	0.000	42.9	14.3	42.9
	Excess	0.000	100.0	0.0	0.0
	Mean±SD	308.000	356±117.5	278.2±88.62	254.4±52.57
	Range				
	p-value	***0.666***			
Hemoglobin	Normal	5.882	70.6	11.8	11.8
	Low	0.000	37.5	12.5	50.0
	Mean±SD	12.850	11.68±2.07	12.13±3.71	11.0±1.99
	Range	12.85 - 12.85	6.55 - 12.13	7.90 - 14.80	7.90 - 13.90
	p-value	***0.018****			

4.4.3 Association between plasma zinc, plasma iron and haemoglobin content with socio-demographic characteristics of children (0-23months) accessing care in C-IYCF program in Zaria, LGA of Kaduna State

The Pearson chi-square values showed no statistical significant between the Plasma zinc concentration and the entire socio-demographic variable as the p-values>0.5 significant level.

The relationship between Plasma iron and socio-demographic variable was statistically significant (X^2=12.370, p =0.015) with only occupation of the caregivers of the children. This explain that the significant higher (13.3%) portion who were normal are likely to be from parents who are farmers than the children from parents who are Business (11.1%). The children from Business (85.7%) parents were more likely to be deficient of Iron than parents who are farmers (85.7%) while the civil service children were significantly highest (100%) in excess iron, than the children from farmers (6.7%) as shown in Table 4.15.

The association between haemoglobin level and socio-demographic variables in Table 4.23 was statistically significant X^2 = 6.694, p =0 .035 with only the wards. These shows that children from Baban Dodo ward were more likely to have normal haemoglobin level than the children from Wuciciri (50%) and Rafin Magaji (25%). Whereas, the remaining variables Age (p=0.413), Educational level (p=0.974), socio-economic status of caregiver (p=0.134), occupation of caregiver (p=0.153), amount earn monthly of caregivers (p=0.664) and the total number of children (p=0.401) in a household were not significantly different with haemoglobin level as their p>0.05.

4.5 Community-IYCF Evaluation Scores in Zaria, LGA of Kaduna State

4.5.1 Community IYCF programme

As shown in Appendix III, more than half (58.3%) of the participant in Rafin Magaji, all (100%) of the participant in Wuciciri ward, and 55.6% in Baban Dodo revealed that they focus much on breastfeeding while 16.7% and 33.3% in Rafin Magaji and Baban Dodo focuses on complementary feeding in the Community IYCF programme.

All the participant in Rafin Magaji, and 37.5% in wuciciri and 88.9% in Baban Dodo responded to the fact that Community programme identified targets or measurable objectives that it is mandated to achieve. Majority (85.7%, 87.5% and 80%) in Rafin magaji, Wuciciri and Baban Dodo respectively agreed they are making progress towards achieving target objectives. However, 6(66.7%), 8(100.0%) and 7(87.5%) in Rafin Magaji, Wuciciri and Baban Dodo respectively believe that the community programme has adequate funds for its implementation. All Wuciciri (100%) participant and half of the participant in Rafin magaji (50%) and Baban Dodo (50%) said financial support is provided by the government.

4.5.2 An active and sustainable baby-friendly hospital initiative

Appendix III shows the active and sustainable baby-friendly hospital initiative (BFHI) in the community IYCF programme in Zaria LGA. From the Appendix III All participants in wuciciri ward, 9(81.8%) and 7(87.5%) in Rafin Magaji and Baban Dodo respectively reported an active and sustainable baby-friendly hospital initiative in the C-IYCF programme. Concerning BFHI training programme in the past year, (40%) in Rafin Magaji ward, 100% in Wuciciri and Baban Dodo response yes. Also, 100% participants in Wuciciri, 4(80%) in Babando and 5(71.4%) Rafin Magaji reported that health facilities are being assessed within 12 months of being ready.

Most of the participants in all the wards (70% n=7, 87.5% n=7 and 66.7% n=6) Rafin Magaji, Wuciciri and Baban Dodo respectively responded to BFHI being integrated within the community health care system and receives adequate resources to sustain it. Majority (80% n=8) in Rafin Magaji and 4(50%) in Baban Dodo Wards response to private hospital as the health encouraged to follow the BFHI Steps, while 6(75%) in Wuciciri response to health or maternal and health centres.

4.5.3 Mother-friendly childbirth strategies

Mother-friendly child birth strategies is presented in Appendix III. All the participants except 1 participant in Rafin Magaji responded to the fact that mother-friendly childbirth or safe motherhood strategy (or equivalent) had been implemented, which encourages birth procedures that are supportive of breastfeeding and that initiative or programme promotes appropriate mother-friendly birth procedures supportive of breastfeeding. Also all except 2(20%) in Rafin Magaji said a community coordinator or other programme official is responsible for promoting birth procedures supportive of breastfeeding.

About 6(60%) participants in Rafin magaji, 6(85,7%) in Baban Dodo and all in Wuciciri, agreed that Standards and guidelines for mother-friendly childbirth procedures and support had been developed and disseminated to all facilities and personnel providing maternity care. Health personnel involved in health-facility births, and home-birth attendants were trained in “mother-friendly” practices as more than half (57.1%, n=4) in Rafin Magaji, all in Wuciciri and about 5(83.3%) attest to the fact (Appendix III).

4.5.4 Health care providers (pre-service) education

Appendix III is the health care providers (pre-service) education. About 8(88.9%) of the Participants in Rafin Magaji and all the participants in the other wards (Babban dodo and Wucciccir wards) reported that the curricula or session plans for medical, nursing, midwifery, allied/public health, and nutrition education programmes is implemented. Concerning whether health care provider schools and pre-service education programmes indicates that IYCF curricula or session plans are adequate, 4(44.4%) in Rafin Magaji said all is adequate, another 4(44.4%) answered none and 1 participant responded to some are adequate. In Wuciciri 8(100%) responded to all while in Baban dodo 4(66.5%) responded to all and the remaining 2(33.3%) said none.

4.5.5 In-service training for health care providers

Appendix III present the result for In-service training for health care providers. Only 4(36.4%) participant in Rafin Magaji wards responded "No" regarding in-service training or continuing education programmes for health care providers update their knowledge and skills related to infant and young child feeding practices. Half of the participant in Rafin Magaji, all in Wuciciri and 3(37%) in Baban Dodo reported that in-service training programmes provide knowledge and skills related to infant and young child feeding for relevant health care providers and is provided throughout the communities. All of the participated staffs in the wards responded to the fact that the training programmes cover most of the essential topics related to infant and young child feeding practices.

Concerning clinical and counselling skills, all of the participated staffs in Wuciciri Wards, 7(85.7%) in Baban Dodo and 6(60%) in Rafin Magaji said Clinical and counselling skills needed on the job are integrated into the content of the training

programmes and is allotted 30% of the training as it can be seen by the response of 11(91.7%) in Rafin magaji ward, all in wuciciri ward and 7(87.5%) in Baban Dodo ward. Majority (87.5%) of the staffs in Wuciciri and 3(27.3%) in Rafin Magaji together with 1 participant in Baban Dodo responded “All” to the fact that content and skills related to infant and young child feeding are integrated, as appropriate, into training programmes focusing on relevant topic

4.5.6 Community outreach and support

Appendix III present the result of the community outreach and support. From the Appendix 4.6, all the participants in wuciciri, 8(72.7%) in Rafin magaji and 6(75%) in Baban Dado said Community outreach and support mechanisms in place to protect promote and support optimal infant and young child feeding.

About 6(60%) of the participants in Rafin Magaji, all in Wuciciri and 6(85.7%) in Baban Dodo had established community-based IYCF activities either as stand-alone and/or integrated within other programmes. All but 6(75%) and 3(50%) in Rafin Magaji and Baban Dodo respectively responded that the Health facility based community outreach and support activities related to IYCF have national (or regional) coverage.

Fifty percent of the participant in Rafin Maggaji, all in Wuciciri and only 1 participant in Baban Dodo said Community-based IYCF outreach and support activities are being implemented. The same proportion except 4(80%) in Baban Dodo also responded that Community-based IYCF outreach and support activities have national (or regional) coverage. All (100%) of the participants in Wuciciri ward and half each of the participants in the other two wards said Non-health organizations are conducting IYCF outreach and support activities at the community level.

Lastly, every (100%) participant in Wuciciri, others in 8 (85.7%) in Rafin Magaji and 6(50%) in Baban Dodo reported that IYCF community outreach and support activities are integrated into an overall infant and child health strategy.

4.5.7 Information education and communication

Appendix III is the information on education and communication (IEC). All the participated staffs in the ward believed that Comprehensive information, education and communication strategies being implemented for improving infant and young child feeding practices and that there is a comprehensive community IEC strategy for improving IYCF as 6(54.5%) in Rafin Magaji ward, All in Wuciciri and 5(71.4%) in Baban Dodo attest to this.

Concerning IEC campaign or programme using electronic, print and event media and activities has channelled messages on infant and young child feeding to targeted audiences during the past 12 months, all responded to “yes”. Also concerning IEC programmes (either governmental or nongovernmental) that include infant and young child feeding practices are being actively implemented at both regional and local levels only 5(71%) persons in Rafin Magaji and a participant in Banban Dodo responded to no. Majority of these participants (8(80%) in Rafin Magaji, 8(100%) in Wuciciri and 5(71%) in Baban Dodo ward) believe that content of IEC messages is technically and clinically sound, based on national or international guideline.

All except one participant in Rafin Magaji responded that the focus and wording of messages based on formative research and pretested with target audiences before use.

4.5.8 Community-IYCF evaluation Scores in Zaria, LGA of Kaduna State

Appendix III shows the overall strength of the community-IYCF. From the result in the Table, An active and sustainable baby-friendly hospital initiative, showed that 39.3%

was rated good, 9(32.1%) rated fair, 6(21.4%) poor while only 2(7.1%) was rated very good. For mother-friendly child birth strategies, 10(33.3%) was rated fair, 9(30%) was rated very good, 6(20%) was rated good while 5(16.7%) was rated poor.

Also, for In-Service training for Health care providers, 9(32.1%), 8(28.6%) and 6(21.4%) were rated fair, very good and good respectively while 5(17.9) was rated poor. Regarding Community Outreach and Support, poor (33.3%, n=9) scores was high, followed by 8(229.6%), 7(25.9%) and 2(7.4%) were rated very good, fair and good respectively. For information on education and communication, 11(42.3%) was rated very good 6(23.1%) each were rated good and fair while 2(7.7) was rated poor.

4.5.9 Association between community-IYCF evaluation scores and wards in Zaria LGA of Kaduna State

Appendix III present the result of the relationship between Community-IYCF programme effectiveness and the Wards. The Significant (chi square=***21.778***; p=0.001) portion rated very good (100%) for Active and Sustainable Baby-Friendly Hospital Initiative are more likely to come from Rafin Magaji C-IYFC programme, while portion rated good (72.7%) were highly significant in Wuciciri than Baban dodo (27.3%).

Community-IYCF Mother-Friendly Child birth Strategies showed a significant relationship with the wards (chi-square=***19.694,*** p- value 0.003). Based on this index, Wuciciri ward were rated very good than the other wards in times of community-IYCF mother-friendly child birth strategies.

A significant (chi square=15.027; p=0.02) higher proportion (80%) of Wuciciri ward C-IYCF programme were rated very good (80%) and good (100%) for health care providers (pre-service) education than the other wards (Table 4.32).

In-Service training for health care providers was significantly (Chi-square= 22.183, p-value=0.001) related to the wards. In-Service training for health care providers is more likely to be effective in Wuciciri wards as 87.5% was rated as very good.

Community outreach and support was significantly (Chi-square= 23.066, p-value=0.003) related to ward. Significant portion rated very good (87.5%) were more likely to come from Wuciciri ward than the others.

Information on education and communication was also significantly (Chi-square= 19.431, p-value=0.013) related to the wards. According to this, significant portion rated very good were more likely to be from Wuciciri ward than the other wards.

CHAPTER FIVE

5.0 Discussion

The study was conducted among 159 caregivers involved in the community infant and young child feeding programme in Zaria LGA of Kaduna State. As a whole, the participants were young, married and uneducated. The findings on marital status are in agreement with study conducted by (Mututho, 2012, Kimani, *et, al.*, 2011) in Kenya. Most of the mothers were from low income family, earning between 5,000 – 10,000 naira as monthly income and depend on farming for provision of food and other necessities. Other studies conducted in Nairobi have similar findings (Kimani, *et, al.*, 2011, Ochola, 2008, Adere, 2007).

The prevalence of stunting, underweight and wasting in our study was found to be 91.1%, 68.6% and 15.1% respectively. The prevalence of underweight, is an indication of acute malnutrition which was higher compared than wasting and lower compared to stunting in community though this was contrary with national prevalence of underweight as found in 2006. Also, the study indicates that the risk of underweight increases with gender, similar with other studies by (Saha, 2004, Sapkota and Gurung, 2009).

The prevalence of wasting among children was 15.1%, about 0.1 percentage points higher than the national prevalence (DHS, 2000). This higher prevalence indicates the effect of short-term nutritional deprivation on children under two. A similar survey in Banda Aceh found that the prevalence of wasting was 12.7% (Webb, 2005). However, in the Banda Aceh study, boys were more severely affected than girls, similar to our findings. On the basis of the epidemiologic criteria established by WHO for assessing the severity of undernutrition in populations, this study demonstrated a high prevalence

of wasting, stunting, underweight among the children under two living in the study community (WHO, 1995). Although the national prevalence of wasting was high, it was not generally above the trigger point of 15% indicated by WHO as of high public health concern (WHO, 1995). Although this study found a level of wasting higher than the trigger point in the study community, a very low level (0.1%) of severely wasted children was observed. One potential limitation of using DHS reference data is that the DHS survey was carried out in 2001 and it indicates overall prevalence without indicating regional variations (DHS, 2001). This study also documented a high prevalence of stunting among the children in comparison with that seen at the national level. This observation documents that the nutritional status of this population may be a longstanding problem (WHO, 2013).

In this study, Mother's education was negatively related to the poor nutritional status of children however association was not significant in case of underweight. A similar association between maternal education and child underweight was also observed in some studies conducted in Nepal and India by (Sapkota and Gurung, 2009, Kumar, 2006). The nutritional status (weight for age and length for age) of the children in the present study shows significant different according to gender. Other studies conducted by (UNICEF and NMIS, 1996) in Nepal and India respectively shows that the prevalence of malnutrition was similar in both the genders in this age group but was different with the present study.

Occupation, number of children in household and monthly income earned, was most important factors associated with stunting, underweight and wasting. It was found that children of household having below 5,000-naira monthly income were almost three times more at risk of being underweight, stunting and wasting and more at risk than the children of household having higher monthly income. A study carried out in the urban

area of Africa regarding socioeconomic determinants of nutritional status also showed that children in the family with poor socioeconomic status were at 2 times high risk of being stunted. (Beka, 2009).

Regarding the occupation of caregiver, the association with stunting, underweight and wasting was not significant. The association of caregivers' occupation with stunting in the present study is supported by the study carried out in Lalitpur, Nepal (Shrestha, 2009). Similarly, the association found between caregiver's occupation and wasting is consistent with some studies by (Beka, 2009, Shrestha, 2009).

Exclusive breastfeeding was done by 8.2% of children under 6 months of age. This was poor than the figures (57.1%) reported by (Sinhababu, *et, al.,* 2010), in their study conducted in West Bengal India. A study from slum of Delhi has shown 57% of the children below 6 months were exclusively breastfed (Sinhababu, *et, al.,* 2010). Studies have reported that about one-fourth of the children who received liquids and solids foods, along with breastfeeding at 0–6 months of age, remained at risk of infectious diseases and under nutrition.

Continued breastfeeding was done by (74.8%) children between 12 and 23 months. This was lower as compared with a study from West Bengal which showed that 91.1% of children between 12 and 23 months were continuing breast feeding (Sinhababu, *et, al.,* 2010).

Minimum dietary diversity (MDD) indicator is the proportion of children 6–23 months of age who receive foods from 4 or more food groups from a total of 7 food groups, namely, dairy products, legumes and nuts, flesh foods, eggs, vitamin A rich fruits and vegetables, cereals reveal whether the child is receiving a complete and balanced diet or

not. MDD was observed in 10.1% of the children between 6 and 23 months (WHO, 2008).

Minimum meal frequency (MMF) indicator is the proportion of breastfed and non-breastfed children aged 6–23 months who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more (WHO, (2008). For breastfed children the minimum number of times varies with age (two times if 6–8 months and three times if 9–23 months). For non-breastfed children, the minimum number of times does not vary by age (four times for all children aged 6–23 months). MMF was observed in about one-half (24.5%) of children aged 6–23 months.

Minimum acceptable diet (MAD) indicator is the proportion of children aged 6–23 months who receive at least the MDD as well as at least the MMF according to the definitions mentioned above (WHO, 2008). This was found to be adequate only in 47.5% of the 6-23 month old children.

Overall from India shows that only 44% of breastfed children are fed at least the minimum number of times recommended and only half of them also consumed food from three or more food groups (NFHS, 2005-06). Feeding recommendations are followed even less often for no breastfeeding children. Overall only 21% of breastfeeding and non-breastfeeding children are fed according to the IYCF recommendations (NFHS, 2005-06). A study done in urban slums of Delhi found 48.6% of children aged 6-23 months are fed the recommended minimum times per day and 32.6% are fed from the appropriate number of groups. The all three recommended IYCF practices were practiced by only 19.7% of mothers of children aged 6-23 months (Sinhababu, *et, al.*, 2010).

The reduction of body iron has three main stages: (i) iron depletion which refers to a decrease of iron stores, measured by a reduction in serum ferritin concentration (Cook, 1999); (ii) iron deficiency, when storage iron is depleted and there is insufficient iron absorption to counteract normal body losses (at this time, haemoglobin synthesis starts to become impaired and haemoglobin concentrations fall), measured by a reduction in serum ferritin, mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) (Yates, *et, al.,* 2004); and (iii) iron deficiency anaemia, the most severe degree of iron deficiency, which refers to a decrease of iron in the red blood cells, measured by a reduction in serum ferritin, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and haemoglobin level. The distinction between "iron deficiency" and "iron deficiency anaemia" is important. They often go hand in hand, but people can be iron deficient without being anaemic (Cook, 1992).

This study shows higher percentage of low level of haemoglobin 68.0% and higher percentage in iron deficiency level 80.0%; iron level observed in this study is a better definition of haemoglobin deficiency. This study is contrary with the study reported by (UNICEF, 2007), that out of 176 anemic patients studied, (48.8%) were diagnosed as iron deficiency anemia while (51.1%) were diagnosed as anemia of chronic disorder (Hanif, *et, al.,* 2005).

This study shows a significant difference in haemoglobin levels while no significant different in iron status with association of age of children in study community; this confirms that tested children were anemic with iron deficiency. Iron deficiency anemia in the subjects tested may be due to poor socio economic condition, dietary or intestinal parasitic infestation or chronic ailments, malaria etc. In this present study, iron deficiency is common in all age group especially in age group 7-12 months and months with 42.9% and 42.9% respectively, this is contrary to the finding by Metinkilin who

reported that, aged 2-5 and 19-40 years with prevalence of 34.5% and 40.0% respectively were anemic (Kilinç, *et, al.,* 2002).

Concerning the zinc level, the prevalence in the deficiency of zinc was much higher (68%) than the 20% set by the Joint WHO/UNICEF/IAEA/IZiNCG Interagency meeting for recognizing zinc deficiency risk of public health importance, needing intervention in a given population (Benoist, *et, al.,* 2007). This finding is a cause for concern, considering the various morbidities associated with zinc deficiency in the paediatric age group. Such morbidities include impaired cognitive function, growth failure, delayed sexual maturation and increased risk of infections (Dibley, 2001, Gropper, et, al., 2005).

Due to differences in cut-off values used in defining zinc deficiency, the prevalence rate found among the subjects disagrees with that reported among preschool children from Cameroon (Engle-Stone, *et, al.,* 2014). Our cut-off value of 11.5-18.5mg/L was higher than the 9.9µmol/L (65µmg/dl) used in the study in Cameroon (Engle-Stone, *et, al.,* 2014). In a previous study by Wessells, *et, al,* 7.65µmol/L was also used as cut-off value (Wessells, *et, al.,* 2014). Justifying its use in our study. On the other hand, our prevalence rate 68.0% was much higher than the 63% reported in another Nigerian study, involving urban preschool children (Ibeanu, *et, al.,* 2017). Together, the higher cut-off value used in our study and the rural nature of the study population may explain the observed higher prevalence rate found in the present study. Zinc deficiency has been shown to be commoner in rural compared with urban children (Onyemaobi, et, al., 2011, Liu, et, al., 2011). Again, the prevalence rate found in our study was higher than 65% found among Beninese rural preschool children (Galetti, *et, al.,* 2016). In that study, a higher cut-off value (9.9umol/L) was used in defining zinc deficiency, probably accounting for the observed differences in prevalence rates. Poverty and illiteracy were

notable findings among the families of the subjects and this is evident in their low socio-economic status (SES). In developing countries, the major etiologic factors for zinc deficiency are low intake of zinc rich foods, poor bioavailability of zinc, and the presence of parasitic infections of the gastrointestinal tract (Gibson, 2006, El-Ghareeb, *et, al.,* 2015, Lazarte, *et, al.,* 2015). Together, these factors which are known to be common in Nigeria, may account for the high prevalence rate of zinc deficiency in the present study (Ibeanu, *et, al.,* 2017, Onyemaobi, et, al., 2011, Abah, *et, al.,* 2012). The result reveal that the lowest (6.70±1.9mg/dl) and the highest (11.42±7.72mg/dl) mean serum zinc concentrations were found among children aged 13 to 18 months and 7 to 12 months, respectively. This suggests that infants had better zinc status than toddlers. In Nigeria, these complementary foods consist mainly of maize and millet which are poor not only in zinc content but also in its bioavailability.

In addition, it is possible that during the period of infancy, a fairly appropriate breast feeding practices are observed in our community, leading to better zinc status among children aged 7 to 12 months (Birch, *et, al.,* 2007). In reference with our finding regarding the influence of age, a study in India reported a similar finding (Dhingra, *et, al.,* 2009). Although not statistically significant, we observed that boys had a slightly low mean serum zinc concentration than girls 9.93±6.84 and 12.35±7.49. In general, this finding is in contrary with the results of a similar study among preschool children in India (Dhingra, *et, al.,* 2009). The reason for the poor zinc status in males than females is attributed to sex hormones (Dey and Chaudhuri, 2008, Baig, *et, al.,* 2000, Patel, *et, al.,* 2013).

Infant and young child feeding programme assessment is often used by UNICEF's offices, in close collaboration with governments and other partners involved in IYCF programming, to regularly monitor and assess the scope and scale of recommended

IYCF actions and identify areas for intervention. It can be used periodically to assess whether progress is being made to address identified gaps.

Some of the key finding areas in Community IYCF programme effectiveness include: Active and Sustainable Baby-Friendly Hospital Initiative, Mother-Friendly Child birth Strategies, Health Care Providers (pre-service) Education, In-Service training for Health care providers, Community Outreach and Support and Information on education and communication.

Another study carried out with professionals from São Paulo, aiming to assess the WHO/UNICEF Breastfeeding Counselling Course demonstrated a significant improvement in counselling skills. In contrast with our study, however, that one was developed to deal solely with the theme of breastfeeding. It was observed that, immediately after the course, the participants' knowledge and skills in clinical management of breastfeeding and counselling significantly improved, in relation to those of the comparison site, and that this was repeated 3 months after intervention (Rea and Venancio, 1999).

Similar findings can be found in the results of studies undertaken in the United Kingdom (Moran, *et, al.*, 2000), Bangladesh (Haider, *et, al.*, 1997), Ghana (Aidam, *et, al.*, 2005), Mexico (Morrow, *et, al.*, 1999) and Brazil (Leite, *et, al.*, 2005). But always in interventions that, while including counselling, give priority to just one feature (or phase of life) of child nutrition, without, such as HIV/AIDS. With relation to the Integrated Course, the subject of this study, including special dietary situations while it may be considered that there were few gains in counselling skills, the good results achieved in general knowledge on infant and young child feeding and dietary practices in Wucciciri ward of the study area may represent a welcome improvement to what is currently found in activeness of health workers in Wucciciri ward of study community.

This evidence emphasizes the importance of carrying out actions relating to counselling on infant and young child feeding that integrate content, in the form of permanent practices, to child healthcare policy, highlighting concern with constantly updating professional's training. The fact that this project was carried out with health professionals who are already working for a large scale institution such as the primary healthcare and in a city with the Metropolitan characteristics of Zaria LGA of Kaduna State, demonstrates its potential for implementation in and adaptation to more circumspect circumstances.

In this study, almost two third of indices measured for the quality of C-IYCF programme were rated very good in some in some sites and rated poor in others. Therefore, this study revealed more strength in Wucciciri than in Babban dodo while poorly strength in Rafin Magaji when compare to standard guideline which is contrary to the study carried out in Kaduna state Kajuru LGA as an intervention site and Kaura LGA as a comparison site, revealed a strongly support for the conclusion that the C-IYCF trainings were successfully implemented in the intervention site and had the intended impact on knowledge and attitudes among health workers and community volunteers (USAID and UNICEF, (2018).

CHAPTER SIX

6.0 Summary, Conclusion and Recommendations

6.1 Summary

i. The study was conducted among 159 caregivers involved in community infant and young child feeding programme in Zaria LGA Kaduna State. The participants were young, married and uneducated with majority (38.4%) earning between 5,000 - 10,000 naira monthly and almost half (44.7%) belonging to a family of 6 – 10 people.

ii. Male and female children were almost equally distributed with 80(50.3%) and 79(49.7%) respectively. With 7 -12 months' children having the highest (56.6%). The mean age of the children was 14±6 and median class each recorded as 12.

iii. The nutritional status of the children shows that 145(91.8%) of the children were severely malnourished and Most (68.6%, n=109) of the children being severely underweight and almost all the children (91.1%, n=144) were severely stunted. Amount earned monthly by the caregivers was the only socio-demographic variable that was significantly associated with weight for length Z-scores of the children (chi-square=19.450, p-value 0.0048), While the ward of the participants was the only socio-demographic variable that was significantly associated with the nutritional status height for age (LAZ) (chi-square =11.2560, p-value=0.021).

iv. Exclusive breastfeeding was as low as 8.2% in children under 6 months of age, and continued breastfeeding was 74.8% in children between 12 and 23 months. MDD was observed in 10.1% of the children between 6 and 23 months, MMF

was observed in about half (24.5%) of children aged 6–23 months and about 47.5% of the children met the minimum acceptable diet.

v. This study shows higher percentage with lower level of haemoglobin 68.0% and higher percentage in iron deficiency level 80.0% and also a higher percentage (68%) of zinc deficiency.

vi. The evaluation of the community infant and young child feeding programme showed that 39% of an Active and Sustainable Baby-Friendly Hospital Initiative, was rated good, 9(32.1%) rated fair, 6(21.4%) poor while only 2(7.1%) was rated Very good. For Mother-Friendly Child birth Strategies, 10(33.3%) was rated fair, 9(30%) was rated very good, 6(20%) was rated good while 5(16.7%) was rated poor. Also, for In-Service training for Health care providers, 9(32.1%), 8(28.6%) and 6(21.4%) were rated fair, very good and good respectively while 5(17.9) was rated poor. For Community Outreach and Support, poor (33.3%, n=9) scores was high, followed by 8(229.6%), 7(25.9%) and 2(7.4%) were rated very good, fair and good respectively. while, for Information education and communication, 11(42.3%) was rated very good 6(23.1%) each were rated good and fair while 2(7.7) was rated poor.

6.2 Conclusion

The nutritional status of children (0-23months) involved in community infant and young child feeding programme were below the WHO cut off; MUAC (1.2%), WLZ (76.1%), WAZ (11.9%) and LAZ (1.3%) respectively. Initiation of Breastfeeding at birth (22%), Exclusive Breastfeeding (8.2%) and complementary feeding practices among the caregivers of the children (0-23months) fell below the WHO recommendation. Micronutrients deficiency of the children (0-23months) involved in community infants and young child feeding programme in Zaria, LGA of Kaduna State is unacceptably

high; (68%) zinc, (80%) iron and (68%) Hb respectively. The poor diet quality of the children and poor quality of C-IYCF programme in Zaria, LGA of Kaduna State were comparative high; MMF (75.5%) , MDD (89.9%) and MAD (52.5%) and rated poor (83.3%) respectively.

6.3 Recommendation

Based on study findings following recommendations are suggested.

i. Need for cohort study on IYCF practices among special groups of caregivers (HIV+ mothers and internally displaced caregivers) of under 2 children involved in C-IYCF program

ii. The children enlisted in C-IYCF program were already malnourished, however C-IYCF program cannot take children out of the malnutrition. Therefore, we recommend that;

iii. Children should be screened using MUAC before enlisted into the C-IYCF program

iv. Severely malnourished children should be transfer to health facility for treatment

v. Moderately malnourished children should be transfer for supplementary feeding program

vi. Adolescents male and female should be sensitized on C-IYCF practices before start putting into birth

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APPENDICES

APPENDIX I

Ethical Approval and Informed Consent

Ethical approval was obtained from the ethical committee of Ahmadu Bello University, Zaria and Kaduna State ministry of health with verbal approval. A written permission was collected from Zaria local government primary healthcare agency (PHCA). A duly approved informed consent were obtained from the caregivers.

APPENDIX II

Community IYCF Programme

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		N	%	N	%	N	%
Community infant and young child feeding programme focus on	Breastfeeding	7	58.3	8	100.0	5	55.6
	Complementary feeding	2	16.7	0	0.0	3	33.3
Community programme identified targets or measurable objectives that it is mandated to achieve.	Yes	11	100.0	3	37.5	8	88.9
	No	0	0.0	5	62.5	1	11.1
Community programme making progress towards achieving those targets objectives?	Yes	6	85.7	7	87.5	4	80.0
	No	1	14.3	1	12.5	1	20.0
Community programme has adequate funds for its implementation	Yes	6	66.7	8	100.0	7	87.5
	No	3	33.3	0	0.0	1	12.5
Financial support provided through the government?	Yes	3	50.0	8	100.0	2	50.0
	No	3	50.0	0	0.0	2	50.0
Community programme a multi sectorial and involves regional and local components, with coordination among existing programmes and initiatives?	Yes	10	100.0	2	66.7	6	85.7
	No	0	0.0	1	33.3	1	14.3

An Active and Sustainable Baby-Friendly Hospital Initiative

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		N	%	N	%	N	%
Active and sustainable Baby-friendly Hospital Initiative	Yes	9	81.8	8	100.0	7	87.5
	No	2	18.2	0	0.0	1	12.5
BFHI coordinator or equivalent is working within the official health care system structure, on at least a half-time basis, to implement the Initiative?	Yes	4	40.0	6	75.0	5	71.4
	No	6	60.0	2	25.0	2	28.6
BFHI training programme provide training or refresher training in the past year	Yes	11	91.7	8	100.0	9	100.0
	No	1	8.3	0	0.0	0	0.0
The community training team replaced, as needed, and receive refresher training	Yes	4	50.0	3	37.5	3	50.0
	No	4	50.0	5	62.5	3	50.0
Health facilities being assessed within 12 months of being ready	Yes	5	71.4	8	100.0	4	80.0
	No	2	28.6	0	0.0	1	20.0
Is“Baby-friendly” hospitals currently being monitor or reassess within five years of designation or are being reassess regularly as part of a national quality assurance, quality of care, or hospital accreditation programme.	Yes	5	55.6	7	87.5	4	57.1
	No	4	44.4	1	12.5	3	42.9
BFHI integrated within the community health care system and receives adequate resources to sustain it.	Yes	7	70.0	7	87.5	6	66.7
	No	3	30.0	1	12.5	3	33.3
Which health facilities or services are encouraged to follow the BFHI Steps?	Private hospitals	8	80.0	2	25.0	4	50.0
	Health or maternal and health centres	1	10.0	6	75.0	2	25.0
	Prenatal services	1	10.0	0	0.0	2	25.0
	Home births	0	0.0	0	0.0	0	0.0
	Others	0	0.0	0	0.0	0	0.0

Mother-Friendly Child Birth Strategies

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		N	%	N	%	n	%
A mother-friendly childbirth or safe motherhood strategy (or equivalent) been implemented, which encourages birth procedures that are supportive of breastfeeding?	Yes	9	90.0	8	100.0	8	100.0
	No	1	10.0	0	0.0	0	0.0
Mother-friendly childbirth strategy been developed?	Yes	4	40.0	8	100.0	3	42.9
	No	6	60.0	0	0.0	4	57.1
Initiative or programme promotes appropriate mother-friendly birth procedures supportive of breastfeeding?	Yes	6	85.7	8	100.0	8	100.0
	No	1	14.3	0	0.0	0	0.0
A community coordinator or other programme official responsible for promoting birth procedures supportive of breastfeeding?	Yes	8	80.0	8	100.0	7	100.0
	No	2	20.0	0	0.0	0	0.0
Standards and guidelines for mother-friendly childbirth procedures and support been developed and disseminated to all facilities and personnel providing maternity care?	Yes	6	60.0	8	100.0	6	85.7
	No	4	40.0	0	0.0	1	14.3
Health personnel involved in health-facility births, and home-birth attendants trained in "mother-friendly" practices.	Yes	4	57.1	6	100.0	5	83.3
	No	3	42.9	0	0.0	1	16.7

Health Care Providers (pre-service) Education

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		n	%	n	%	n	%
The curricula or session plans of medical, nursing, midwifery, allied/public health, and nutrition education programmes	Yes	8	88.9	8	100.0	6	100.0
	No	1	11.1	0	0.0	0	0.0
Health care provider schools and pre-service education programmes indicates that IYCF curricula or session plans are adequate.	All	4	44.4	8	100.0	4	66.7
	Some	1	11.1	0	0.0	0	0.0
	None	4	44.4	0	0.0	2	33.3
Medical	Yes	0	0.0	6	75.0	1	14.3
	No	10	100.0	2	25.0	6	85.7
Nursing	Yes	0	0.0	6	75.0	1	14.3
	No	10	100.0	2	25.0	6	85.7
Midwifery	Yes	7	70.0	5	62.5	6	85.7
	No	3	30.0	3	37.5	1	14.3
Allied/public health	Yes	0	0.0	5	62.5	1	14.3
	No	10	100.0	3	37.5	6	85.7
Nutrition	Yes	3	30.0	8	100.0	2	28.6
	No	7	70.0	0	0.0	5	71.4

In-Service Training for Health Care Providers

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		N	%	n	%	n	%
In-service training or continuing education programmes for health care providers update their knowledge and skills related to infant and young child feeding?	Yes	7	63.6	8	100.0	7	100.0
	No	4	36.4	0	0.0	0	0.0
In-service training programmes provide knowledge and skills related to infant and young child feeding for relevant health care providers?	Yes	5	50.0	8	100.0	3	37.5
	No	5	50.0	0	0.0	5	62.5
In-service training programmes provided throughout the communities?	Yes	7	63.6	8	100.0	7	87.5
	No	4	36.4	0	0.0	1	12.5
The training programmes cover most of the essential topics related to infant and young child feeding?	Yes	8	100.0	8	100.0	7	100.0
	No	0	0.0	0	0.0	0	0.0
Clinical and counselling skills needed on the job are integrated into the content of the training programmes?	Yes	6	60.0	8	100.0	6	85.7
	No	4	40.0	0	0.0	1	14.3
Clinical and counselling skills allotted at least 30% of training time?	Yes	11	91.7	8	100.0	7	87.5
	No	1	8.3	0	0.0	1	12.5
Is content and skills related to infant and young child feeding are integrated, as appropriate, into training programmes focusing on relevant topics	All	3	27.3	7	87.5	1	12.5
	Some	2	18.2	1	12.5	4	50.0
	None	6	54.5	0	0.0	3	37.5

Community Outreach and Support

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		n	%	N	%	n	%
Community outreach and support mechanisms in place to protect promote and support optimal infant and young child feeding.	Yes	8	72.7	8	100.0	6	75.0
	No	3	27.3	0	0.0	2	25.0
Health facility based community outreach and support activities related to infant and young child feeding (IYCF) are being implemented.	Yes	6	60.0	8	100.0	6	85.7
	No	4	40.0	0	0.0	1	14.3
Health facility based community outreach and support activities related to IYCF have national (or regional) coverage.	Yes	6	75.0	8	100.0	3	50.0
	No	2	25.0	0	0.0	3	50.0
Community-based IYCF outreach and support activities are being implemented.	Yes	1	50.0	7	100.0	1	33.3
	No	1	50.0	0	0.0	2	66.7
Community-based IYCF outreach and support activities have national (or regional) coverage.	Yes	1	50.0	8	100.0	4	80.0
	No	1	50.0	0	0.0	1	20.0
Non-health organizations (e.g. agricultural extension, education, credit groups) are conducting IYCF outreach and support activities at the community level.	Yes	5	50.0	8	100.0	3	50.0
	No	5	50.0	0	0.0	3	50.0
IYCF community outreach and support activities are integrated into an overall infant and child health strategy (inter sectorial and intra sectorial).	Yes	8	72.7	8	100.0	6	85.7
	No	3	27.3	0	0.0	1	14.3

Information on education and communication

		Wards					
		Rafin Magaji		Wuciciri		Baban Dodo	
		n	%	N	%	n	%
Comprehensive information, education and communication strategies being implemented for improving infant and young child feeding?	Yes	8	100.0	8	100.0	6	100.0
	No	0	0.0	0	0.0	0	0.0
There a comprehensive community IEC strategy for improving IYCF?	Yes	6	54.5	8	100.0	5	71.4
	No	5	45.5	0	0.0	2	28.6
IEC campaign or programme using electronic, print and event media and activities has channelled messages on infant and young child feeding to targeted audiences during the past 12 months?	Yes	11	100.0	8	100.0	7	100.0
	No	0	0.0	0	0.0	0	0.0
IEC programmes (either governmental or nongovernmental) that include infant and young child feeding issues are being actively implemented at both regional and local levels?	Yes	6	54.5	8	100.0	6	85.7
	No	5	45.5	0	0.0	1	14.3
Individual counselling and group education services related to IYCF are available within the health care system or through community outreach?	Yes	6	75.0	8	100.0	5	71.4
	No	2	25.0	0	0.0	2	28.6
Content of IEC messages is technically and clinically sound, based on national or international guidelines?	Yes	8	80.0	8	100.0	5	71.4
	No	2	20.0	0	0.0	2	28.6
The focus and wording of messages based on formative research and pretested with target audiences before use?	Yes	8	88.9	8	100.0	7	100.0
	No	1	11.1	0	0.0	0	0.0

Evaluation Scores of C-IYCF Program Centres in Zaria LGA of Kaduna State

Variables		Frequency	Percentage (%)
An Active and Sustainable Baby-Friendly Hospital Initiative (n=28)	Poor	6	21.4
	Fair	9	32.1
	Good	11	39.3
	Very Good	2	7.1
Mother-Friendly Child birth Strategies (n=30)	Poor	5	16.7
	Fair	10	33.3
	Good	6	20.0
	Very Good	9	30.0
In-Service training for Health care providers (n=28)	Poor	5	17.9
	Fair	9	32.1
	Good	6	21.4
	Very Good	8	28.6
Community Outreach and Support (n=27)	Poor	9	33.3
	Fair	7	25.9
	Good	2	7.4
	Very Good	8	29.6
Information on education and communication (n=25)	Poor	2	7.7
	Fair	6	23.1
	Good	6	23.1
	Very Good	11	42.3

Relationship between the Selected Centres of C-IYCF Program in Zaria LGA of Kaduna State

		Wards				
		Rafin Magaji	Wuciciri	Baban Dodo	Chi-square test	
		%	%	%	X	p-value
An Active and Sustainable Baby-Friendly Hospital Initiative	Poor	50.0	0.0	50.0	***21.778***	***0.001****
	Fair	66.7	0.0	33.3		
	Good	0.0	72.7	27.3		
	Very Good	100.0	0.0	0.0		
Mother-Friendly Child birth Strategies	Poor	60.0	0.0	40.0	***19.694***	***0.003****
	Fair	60.0	0.0	40.0		
	Good	66.7	16.7	16.7		
	Very Good	0.0	77.8	22.2		
Health Care Providers (pre-service)Education	Poor	60.0	0.0	40.0	***15.027***	***0.020****
	Fair	50.0	25.0	25.0		
	Good	0.0	100.0	0.0		
	Very Good	0.0	80.0	20.0		
In-Service training for Health care providers	Poor	80.0	0.0	20.0	***22.183***	***0.001****
	Fair	44.4	0.0	55.6		
	Good	50.0	16.7	33.3		
	Very Good	12.5	87.5	0.0		
Community Outreach and Support	Poor	66.7	0.0	33.3	***23.066***	***0.003****
	Fair	57.1	0.0	42.9		
	Good	0.0	50.0	50.0		
	Very Good	0.0	87.5	12.5		
Information on education and communication	Poor	100.0	0.0	0.0	***19.431***	***0.013****
	Fair	50.0	0.0	50.0		
	Good	50.0	0.0	50.0		
	Very Good	18.2	72.7	9.1		

The Chi-square statistic is significant at the .05 level.

APPENDIX III

Survey questionnaire

SECTION 2: SOCIO-DEMOGRAPHICS CHARACTERISTICS

Kindly tick the corresponding boxes in the questionnaire below as accurately as possible.

Name of caregiver….……

i. Sex of caregiver: male { }, female { }
ii. Age of Caregiver: { }
iii. Name of the child…….……
iv. Sex of the child: male { }, female { }
v. Age of the child: { }
vi. Marital status of Caregiver: single { }, married { }, divorcee { }, widow { }
vii. Education status of Caregiver: primary { }, secondary { }, vocational { }, technical { }, post-secondary { }, tertiary { }
viii. Social economic status of Caregiver: lower { }, middle { }, high { }
ix. Occupation of Caregiver: farmer { }, business { }, civil servant { }
x. Amount earn per month of Caregiver: N2,500 { }, N5,000 { }, N10,000 { }, N15,000 { }, N20,000 { }, N25,000 { } N50,000 { }, N100,000 { }, N100,000 above.
xi. Number of people in the household----------

SECTION 3: FEEDING PRACTICES

Circle the number that corresponds with the answer you choose. If you have any questions or do not understand the statement/question being asked, please feel free to write your questions or comments on the questionnaire. Thank you

QUESTIONS	YES	NO	I DON'T KNOW
Has this child ever been breastfed?	1	2	3
Was this child breastfed yesterday during the day or at night?	1	2	3
Now I would like to ask you about some medicines and vitamins that are sometimes given to infants. Was this child given any vitamin drops or other medicines as drops yesterday during the day or at night?	1	2	3
Next I would like to ask you about some liquids that this child may have had yesterday during the day or at night. Has this child drank water?	1	2	3
Infant formula such as Cerelac, Friso Gold?	1	2	3
Juice or Juice Drinks?	1	2	3
Yoghurt?	1	2	3
I want to know if this child has eaten solid foods yesterday during the day or at night. Have you given this child Porridge, bread, rice, noodles, or other foods made from grains?	1	2	3
Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside	1	2	3
White potatoes, white yams, cassava, or any other	1	2	3

foods made from roots			
Any dark green leafy vegetables	1	2	3
Liver, kidney, heart, or other organ meats	1	2	3
Eggs, Fresh or dried fish, shellfish, or seafood	1	2	3
Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits	1	2	3
Foods made with red palm oil, red palm nut, or red palm nut pulp sauce	1	2	3
Did this child eat any solid, semi-solid, or soft foods yesterday during the day or at night?	1	2	3
Did this child drink anything from a bottle with a nipple yesterday during the day or night?	1	2	3

SECTION 4: ANTHROPOMETRIC MEASUREMENTS

i. Weight ---------- (kg)
ii. Height---------- (m)
iii. Age----------(months)
iv. Mid Upper Arm Circumference --------- (cm)
v. Weight for Height ----------
vi. Weight for Age----------
vii. Height for Age----------

SECTION 5: MICRONUTRIENT ASSESSMENT

i. Zinc ----------
ii. Iron----------
iii. Haemoglobin----------

SECTION 6: FOOD FREQUENCY/ DIETARY INTAKE RECORD

Kindly tick the corresponding boxes in the questionnaire below as accurately as possible. How often do you consume the following foods?

FOOD CLASSES/ TYPES	**1 or less times per week**	**1 – 3 times per week**	**4 – 6 times per week**	**7 or more times per week**
Meat, Fish, Poultry.	[]	[]	[]	[]
Milk, Dairy Products, Yoghurt.	[]	[]	[]	[]
Beans, peas, soya beans (tofu), groundnuts, kuli kuli, beans products e.g moi moi, kosai.	[]	[]	[]	[]
Eggs (boiled, fried etc).	[]	[]	[]	[]
Fruits e.g Oranges, water melons, apples, banana etc.	[]	[]	[]	[]
Cereals (guinea corn, wheat, rice, millet, semovita etc), Bread, pasta (spaghetti, noodles, macaroni etc).	[]	[]	[]	[]
Legumes, carrots, potatoes (sweet, irish etc), leafy vegetables.	[]	[]	[]	[]
Cakes and confectionaries, biscuits, pies, buns, puff puff etc.	[]	[]	[]	[]
Beverages (milo, bournvita, ovaltine etc).	[]	[]	[]	[]

Soft drinks, (fanta, maltina, coke etc).	[]	[]	[]	[]
Coffee, Tea (green tea, black tea etc).	[]	[]	[]	[]

SECTION 9: DIETARY DIVERSITY

Please describe the foods (meals and snacks) that was eaten or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink eaten in the morning.

BREAKFAST	SNACK	LUNCH	SNACK	DINNER	SNACK

FOOD GROUPS	EXAMPLES	YES (1) NO (2)
FLESH MEATS	Meat, Fish, Poultry.	
MILK AND MILK PRODUCTS	Milk, Dairy Products, Yoghurt.	
LEGUMES, NUTS AND SEEDS	Beans, peas, soya beans (tofu), groundnuts, kuli kuli, beans products e.g moi moi, kosai.	
EGGS	Eggs (boiled, fried etc).	
VITAMIN A RICH FRUITS	Fruits e.g Oranges, water melons, apples, banana etc	
CEREALS	Cereals (guinea corn, wheat, rice, millet, semovita etc), Bread, pasta (spaghetti, noodles, macaroni etc).	

VITAMIN A RICH VEGETABLES	Legumes, carrots, potatoes (sweet, irish etc), leafy vegetables.	
SWEETS	Cakes and confectionaries, biscuits, pies, honey, candies, puff etc. buns, Soft drinks, (fanta, maltina, coke etc).	
BEVERAGES, SPICES, CONDIMENTS	Beverages (milo, bournvita, ovaltine etc), Coffee, Tea (green tea, black tea etc)..	

APPENDIX IV

SECTION 10: COMMUNITY INFANT AND YOUNG CHILD FEEDING PROGRAMME

Kindly tick the corresponding boxes in the questionnaire below as accurately as possible.

i. Is there a community infant and young child feeding programme? Yes { } no { }

If yes,

ii. What did community infant and young child feeding programme focus on?:

- breastfeeding { },
- complementary feeding { },
- micronutrients { }

iii. Did community programme identified targets or measurable objectives that it is mandated to achieve?. Yes { } no { } , if yes,

iv. What are the objectives?.....

v. Is community programme making progress towards achieving those targets and objectives? Yes { } no { }

vi. Is community programme has adequate funds for its implementation? Yes { } no { }.

vii. Is financial support provided through the government? Yes { } no { }.

viii. Is community programme a multi sectoral and involves regional and local components, with coordination among existing programmes and initiatives? Yes { } no { }. If yes,

ix. What are the community programme(s), the strategies and activities related to IYCF include their coverage?.....

x. What is the name and title of the national coordinator(s)?.....

xi. What is the level and time period of funding available nationally, regionally, and locally for related IYCFactivities?.....

AN ACTIVE AND SUSTAINABLE BABY-FRIENDLY HOSPITAL INITIATIVE

i. Is there an active and sustainable Baby-friendly Hospital Initiative? Yes { } no { }

ii. Is community BFHI coordinator or equivalent is working within the official health care system structure, on at least a half-time basis, to implement the Initiative? Yes { } no { }.
iii. Is community BFHI training programme provide training or refresher training in the past year? Yes { } no { }.
iv. Is members of the community training team replaced, as needed, and receive refresher training? Yes { } no { }.
v. Have health facilities being assessed within 12 months of being ready? Yes { } no { }.
vi. Is "Baby-friendly" hospitals currently being monitor or reassess within five years of designation or are being reassess regularly as part of a national quality assurance, quality of care, or hospital accreditation programme? Yes { } no { }
vii. Is BFHI integrated within the community health care system and receives adequate resources to sustain it? Yes { } no { }.
viii. Which health facilities or services are encouraged to follow the BFHI Steps? private hospitals { }, health or maternal and health centres { }, prenatal services { } home births { } other (describe): ……
ix. Is there are problems in sustaining BFHI, indicate the key obstacles……

MOTHER-FRIENDLY CHILDBIRTH STRATEGIES

i. Has a mother-friendly childbirth or safe motherhood strategy (or equivalent) been implemented, which encourages birth procedures that are supportive of breastfeeding? Yes { } no { }
ii. Is mother-friendly childbirth strategy been developed? Yes { } no { }.
iii. Is initiative or programme promotes appropriate mother-friendly birth procedures supportive of breastfeeding? Yes { } no { }
iv. Is a community coordinator or other programme official responsible for promoting birth procedures supportive of breastfeeding? yes { } no { }
v. Is standards and guidelines for mother-friendly childbirth procedures and support been developed and disseminated to all facilities and personnel providing maternity care? Yes { } no { }

vi. Is health personnel involved in health-facility births, and home-birth attendants trained in "mother-friendly" practices? Yes { } no { }.

vii. What is the name of community coordinator for mother friendly initiative (or equivalent) ?.....

viii. What are the key components of the mother-friendly initiative (or equivalent)?.....

ix. What are the type of training given on mother-friendly practices?.....

x. who provides it?.....

xi. Who receives it? …….

xii. What are the key challenges in developing and implementing an effective mother friendly childbirth strategy?.....

HEALTH CARE PROVIDER (PRE-SERVICE) EDUCATION

i. Do the curricula or session plans of medical, nursing, midwifery, allied/public health, and nutrition education programmes provide students with the attitudes, knowledge and skills necessary to protect, promote, and support optimal breastfeeding and complementary feeding? Yes { } no { }

ii. Is a review of health care provider schools and pre-service education programmes in your country indicates that infant and young child feeding curricula or session plans are adequate in: medical schools, nursing schools, midwifery education programmes, allied/public health education programmes, nutrition/dietetic education programmes? "all" { }, "some"{ }, "none"{ }

iii. If reporting on more than one of each type of school, programme or department) Curriculum or session plans are adequate* in Breastfeeding Complementary feeding indicate type of school or education programme.

- Medical { }
- Nursing { }
- Midwifery { }
- Allied/public health { }
- Nutrition { }

IN-SERVICE TRAINING FOR HEALTH CARE PROVIDERS

i. Do in-service training or continuing education programmes for health care providers update their knowledge and skills related to infant and young child feeding? Yes { } no { }
ii. Does In-service training programmes provide knowledge and skills related to infant and young child feeding for relevant health care providers? Yes { } no { }
iii. Is In-service training programmes provided throughout the communities? Yes { } no { }
iv. Is the training programmes cover most of the essential topics related to infant and young child feeding? Yes { } no { }
v. Is clinical and counselling skills needed on the job are integrated into the content of the training programmes? Yes { } no { }
vi. Is clinical and counselling skills allotted at least 30% of training time? Yes { } no { }
vii. Is content and skills related to infant and young child feeding are integrated, as appropriate, into training programmes focusing on relevant topics (including diarrhoeal disease, acute respiratory infection, IMCI, well-child care, family planning, nutrition, the International Code of Marketing of Breast-milk Substitutes, HIV/AIDS)? All { }, Some { }, None { }

If reporting on more than one of each type of relevant topics indicate:

i. Diarrhoeal disease { },
ii. Acute respiratory infection { },
iii. IMCI[integrated management of childhood illness]{ },
iv. Well-child care { },
v. Family planning { },
vi. Nutrition { }
vii. The International Code of Marketing of Breast-milk Substitutes { }
viii. HIV/AIDS { }
ix. Is training programmes cover infant and young child feeding for most relevant community-based health practitioners, including traditional? Yes { } no { }

COMMUNITY OUTREACH AND SUPPORT

i. Are community outreach and support mechanisms in place to protect, promote and support optimal infant and young child feeding? Yes { } no { }
ii. Is health facility based community outreach and support activities related to infant and young child feeding (IYCF) are being implemented? Yes { } no { }
iii. Does health facility based community outreach and support activities related to IYCF have national (or regional) coverage? Yes { } no { }
iv. Does community-based IYCF outreach and support activities are being implemented?
v. Is community-based IYCF outreach and support activities have national (or regional) coverage? Yes { } no { }
vi. Does non-health organizations (e.g. agricultural extension, education, credit groups) are conducting IYCF outreach and support activities at the community level? Yes { } no { }
vii. IYCF community outreach and support activities are integrated into an overall infant and child health strategy (inter sectoral and intra sectoral)? Yes { } no { }.

INFORMATION, EDUCATION AND COMMUNICATION [IEC]

i. Are comprehensive information, education and communication strategies being implemented for improving infant and young child feeding? Yes { } no { }
ii. Is there a comprehensive community IEC strategy for improving IYCF? Yes { } no { }.
iii. Is IEC campaign or programme using electronic, print and event media and activities has channelled messages on infant and young child feeding to targeted audiences during the past 12 months? Yes { } no { }
iv. Is IEC programmes (either governmental or nongovernmental) that include infant and young child feeding issues are being actively implemented at both regional and local levels? Yes { } no { }.

v. Does individual counselling and group education services related to IYCF are available within the health care system or through community outreach? Yes { } no { }

vi. Does content of IEC messages is technically and clinically sound, based on national or international guidelines? Yes { } no { }

vii. Does the focus and wording of messages based on formative research and pretested with target audiences before use? Yes { } no { }

Thank you for your time and response