



**DETERMINANTS OF COMPLEMENTARY FEEDING PRACTICES  
AMONG CARE GIVERS OF CHILDREN AGED BETWEEN 6-23  
MONTHS: A SECONDARY DATA ANALYSIS FROM RWANDA  
DEMOGRAPHIC AND HEALTH SURVEY 2014-2015**

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A dissertation submitted in partial fulfillment of the requirements for the award of degree of master's of nursing sciences in track of pediatric nursing in the College of Medicine and Health Sciences

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**JUNE 2017**

## DECLARATION

I, MUREKATETE UGIRA RACHEL, declare that this research project entitles: Determinants of Complementary feeding practices among caregivers of children aged between 6-23 months: a secondary data analysis from Demographic and Health Survey 2014-2015. Is my original work. It has never been submitted for another purpose, or at any other University. Sources of information utilized in this work will be acknowledged in the reference list.

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Date : June 2017

## **ABSTRACT**

**Background:** Feeding practices have an important effect on childhood development. Infants feeding practices encompass breastfeeding and complementary feeding. An optimal infant feeding practice contributes to the decrease in the risks of childhood mortality and morbidity and adds to child development growth. The World Health Organization (WHO), in the Infant and Young Child Feeding (IYCF) guidelines, recommends at least 5 months exclusive breastfeeding and this shall be supported by a complementary food that goes up to 2 years or above. Despite the gain recorded from adequate infant feeding practices, current documented evidence is yet to meet the WHO standards especially in developing countries where optimal feeding practices vary between 15% to 71% of the case. Purpose of study: the study was purported to identify determinants of complementary feeding especially minimum dietary diversity

**Methods:** this was a secondary data analysis from Rwanda Demographic and health survey (2014-15). To select the sample, the Rwanda Demographics and health survey used multi-stage sampling strategies. At the start, the village was selected as clusters. And household sampling was done with the probability proportional to the village size. Thereafter, a mapping process continued with a listing of all household in the corresponding Village. RDHS surveyed 3615 under five year's children of which 220 were aged between 6-8 months.

**Results:** Results of this study showed that 56.7% of the participants timely initiated the soft and solid food while those who fed their kids with Minimum Dietary Diversity were at 32% only. Results on factors associated with complementary feeding especially Minimum Dietary Diversity document that the more the mother is educated the more likely she is able to feed the child with minimum dietary diversity (OR: .397, CI: .228; 694,  $p \leq .001$ ). it was found as well that people who are wealthier and staying in cities are the ones to provide adequate Minimum Dietary Diversity (OR:.485, CI: .296;.796,  $p \leq .004$ ). (OR: .530, CI: .368; .765,  $p \leq .001$ )

## **Conclusion**

Complementary feeding practices especially Minimum Dietary Diversity is far from meeting the standards. Factors that include a zone of residence, marital status, mother education, and the wealth categories influence the complementary feeding practices.

## **DEDICATION**

To almighty God who guided me at every step of my studies also in my research project. To my Husband Kayisire Fidele, my children Kaliza Jayla, Muganwa Jay and all my family for their invaluable love, support, and their resolute patience all along my studies.

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## **ACRONYMS**

<b>CF</b>	Complementary Feeding
<b>ANC</b>	Antenatal care
<b>KR</b>	Kids Records
<b>HIV</b>	Human Immune Deficiency Virus
<b>IRB</b>	Institutional Review Board
<b>IYCF</b>	Infant and Young Child Feeding
<b>MDD</b>	Minimum dietary diversity
<b>MDGs</b>	Millennium development goals
<b>NISR</b>	National Institute of Statistics of Rwanda
<b>NISR</b>	National Institute of Rwanda
<b>OR</b>	Odds Ratio
<b>RDHS</b>	Rwanda Demographics and Health Survey
<b>RMoH</b>	Rwanda Ministry of Health
<b>SUN</b>	Scale up Nutrition
<b>UNICEF</b>	United Nations International Children's Emergency Fund
<b>USA</b>	United States of America
<b>USAID</b>	United States Agency for International Development
<b>WHO</b>	World Health Organization
<b>CI</b>	Confidence Interval
<b>RDC</b>	Republic of Democratic of Congo
<b>UN</b>	United National

# **CHAPTER I: INTRODUCTION AND BACKGROUND TO THE STUDY**

## **I.1. INTRODUCTION**

International organization proposes an introduction of complementary feeding from the age of 6 months. At this age children in vulnerability period which correspond to the transition from breastfeeding and complementary feeding. Woman and other caretakers have to ensure that infants' nutritional needs are met, which means that complementary feeding should meet the recommended guidelines (WHO, 2007, p5-9).

The number of mothers who introduced complementary feeding on time varies within and across the countries. In the literature, it is reported that many mothers (care providers) introduce their infants to complimentary too early or too late and both are not detrimental to child nutritional status and hence to his growth. (Nakamori et al. 2010 p45-47).

## **I.2 BACKGROUND TO THE STUDY**

Feeding practices have proved to significantly impact on childhood health. Infants feeding practices combine both breastfeeding and complementary feeding. When they are optimally done, they decrease the risks of childhood mortality and morbidity and contribute to child development growth (Heidkamp et al. 2015, p815-816). The World Health Organization (WHO) In the Infant and Young Child Feeding (IYCF) guidelines, recommends at least 5 months exclusive breastfeeding and this shall be supported by a complementary food that goes up to 2 years or above (Hanif 2011, p1-7).

From the WHO recommendations; Governments formulated policies that guide complementary feedings in many developing countries(Heidkamp et al. 2015,p2-12). However, despite the existence of guidelines, inadequate complementary feeding is still reported. As an example in a study conducted in Pakistan Hafsa and colleagues found big suboptimal feeding practices (Hanif 2011, p1-7). The same was found in Teheran (Shams et al. 2016, p1-6). Many other studies from South Asia indicated that the rate of initiation of complementary food at 6–8 months of age is reasonably good (71%). However, other feeding practices indicators among 6 to 23 months

remain low (Senarath & Dibley 2012, p1-10). In another study done comparing complementary feeding practices in South Asian countries revealed that initiation of complementary food was inconsistent (Menon 2012 p1-4). As an example the Minimum Dietary Diversity was adequately done in 15% of the case in India and at 71% in Bangladesh, 71% in Sri Lanka, and 34% in Nepal (Senarath et al. 2012, p89-98). In South America breastfeeding and complementary were found inadequate in quality and quantity in a study conducted in Brazil (Souza et al. 2014, p231-233)and Guatemala (Hernández et al. 2011, p572-574).

The problem of inadequate complementary feeding was observed in Sub-Saharan Africa as well. For example in a study conducted in Ghana, it was found that the prevalence of complementary feeding was far below the WHO-recommended standard of 90 % coverage (Issaka et al. 2015, p669). Additionally, a study conducted in Ethiopian found that the timely initiation of complementary feeding was at 18.8% among mothers of 6-23 months aged children. The appropriate complementary feeding was at 9. 5% for children aged between 18-23 months which is low (Kassa et al. 2016, p2-10).

Poor complementary feeding was associated with the nutritional deficit, and when it happens to the period ranging from 2 to 6 months it causes a devastating problem because the period corresponds to a dietary transition period where significant physiological demands necessary for growth and development of the child are on the increase. The most direct consequences of poor complementary feeding practices include childhood undernutrition which embraces stunting, wasting, underweight and micronutrient deficiency (Heidkamp et al. 2015, p815-817).

Malnutrition among children is still a matter of concern in developing countries, and many cases are observed in southern Asia and sub-Saharan African countries (Müller & Krawinkel 2005, 279-283). Researchers proved that feeding practices and poor diets from developing countries are the basic explanation to the growing cases of childhood malnutrition (Millward & Jackson 2004, p381-405). There are insufficient Dietary intakes among children in developing countries; additionally, the nutritional value of their food intake was reported to be low because in most of the case the diet is plant-based, which is poor in essential nutrients (Victora et al. 2010, p186-203). Many researchers have reported that the increase in the prevalence of childhood malnutrition is due to poor child-feeding practices (Anigo et al. 2009, p4211). And this can be the consequences of the inappropriate quality of foods, poverty or ignorance in the households.

For instance, protein from animal origins are difficult to get in developing countries as a consequence of unaffordable cost (Anigo et al. 2009, p26-31); and hence Households stick on low-protein foods. There is evidence that families depending on the above-mentioned diet without any other supplement are prone to malnutrition especially for under five years children (Anigo et al. 2009,p155-56).

Other factors that contribute to inadequate complementary feeding mentioned in the literature is lack of knowledge on what and when to initiate complementary feeding and this was mentioned in a study conducted in Uganda (Nankumbi & Muliira,P11) and because of woman and caretakers are desperately looking for information on what to give to children when breast milk is not enough, their closest family members or neighbors are the only source of information that is not necessarily correct (Hanif 2011, p2-7). Additional barriers to adequate complementary feeding were a cultural influence, the amount of responsibility that the caregivers have in the household (Nankumbi & Muliira 2015, p106-8). In Nepal socio-demographic factors that include the age of the mother (caregiver,) her level of education, a number of antenatal care visits attended, economic status and area of residence were identified as independent determinants of complementary feeding (Khanal et al. 2013,p1).

In Rwanda like other developing countries, under nutrition among children is a public health issue. The worse of nutrition indicators among under 5 years children in Rwanda is stunting which affected 44% of under five years Children in 2010. Rwanda as a signatory of the millennium development goals (MDG), has achieved a tremendous progress in fighting against malnutrition in general and stunting in Particular. Rwanda recorded a decrease in stunting of 6% (from 44% to 38%) in 5 years only (NISR, 2015, p147). Such success is the fruits of combined efforts against malnutrition which mostly are embedded in thousand day's campaign. The last addressed many crosscutting issues that are potential risk factors to childhood malnutrition. There are several competing risks factors to childhood malnutrition and risks varies from community /social factors, household/ family, and this include infant feeding practices which embrace breastfeeding and complementary feeding practices (MoH 2014, p1-10).

The situation on feeding practices in Rwanda was reported in the latest Rwanda Demographics and Health Survey (RDHS2014-2015). According to RDHS 2014-2015, as few as 47% of kids in the age range of 6-23 months were fed with the minimum number of times. And only 30 % of

them were fed within the standards to food diversity (four or more food groups). In general, the proportion of kids within the age range of 6-23 months who were fed in accordance with IYCF recommendations were 18 % (NISR, 2015, p155). Sub-Saharan Africa, Asia, and South American countries report a high rate of poor compliance to IYCF (Fanzo 2012, p2-55, Senarath et al. 2012, p22). Different researchers agree that socio-demographics, economic, environmental factors along with feeding practices play a role in the development of childhood malnutrition in developing the world. They are several pathways to malnutrition; however, insufficient quantity and quality of food that is not timely given the lead to child growth faltering. The last is worsened by childhood morbidity which often occurs as fever or diarrhea (Dewey & Mayers 2011, p129-139). A combination of both malnutrition and morbidity end up in topping up the childhood mortality (Dewey & Mayers 2011, p129-139).

### **1.3. PROBLEM STATEMENT**

Determinants of malnutrition among children in Rwanda might be many, and limited access to food can count among valid reasons because many citizens stay in the rural zone where subsistence farming that depends on climate and land size is the main source of food. Additionally, the report from RDHS 2014-2015 informed that only 18% of children aged between 6-23 months in Rwanda fed according to IYCF recommendations. To date, there is no published information on the potential determinants to complementary feeding in Rwanda. But, the Ministry of Health (MoH) in partnership with UNICEF, showed that mothers (caregivers) have a limited knowledge on complementary feeding and only 21% of them had appropriate knowledge on recommended IYCF (WHO/UNICEF 2013, p5-9). This means that a huge number of mothers and caregivers introduce complementary feeding much too early or too late. The early introduction of complementary food is undesirable; particularly in a developing country including those from sub-Saharan countries, because, the typical weaning food is of poorer quality than breast milk and may be contaminated. Besides poverty and socio-demographic factors associated with poor complementary feeding, researchers identified culture, believes as playing a role in predicting the complementary feeding practices (Nankumbi & Muliira 2015, p106-8).

To date literature from Rwanda report that the complementary feeding is yet to meet the standard. Additionally, the knowledge and practices of complementary feeding are at a lower



level (WHO/UNICEF 2013, p38).In the limit of our knowledge, there is no study that documented the reason why the complementary feeding practices are not meeting the standards and given its potential role in childhood malnutrition it's interesting to investigate independent risk factors to suboptimal complementary feeding which is the role of this study.

#### **I.4 THE AIM OF THE STUDY**

To identify the determinants of complementary feeding practices among caregivers of children aged between 6 to 23 months using RDHS2014-2015

##### **Research objectives**

- To identify the determinants of complementary feeding practice among mothers/caregivers and young children aged 6-23 months in Rwanda.
- To describe the complementary feeding practices of mothers/ caregivers of children aged between 6-23 months in Rwanda.
- To describe the rate of compliance with recommended food groups among mothers/ caregivers of children aged 6-23 months in Rwanda.

##### **Research questions**

- What are the determinants of complementary feeding practices among mothers/caregivers of children in the age range of 6 to 23 months old in Rwanda?
- What are the practices of complementary feeding among mothers /caregivers of children in the age range of 6 to 23 months old in Rwanda?
- What is the rate of compliance with the recommended food groups among mothers/ caregivers of children aged 6-23 months in Rwanda?

## **I.5 SIGNIFICANCE OF THE STUDY**

Early childhood nutrition is an important determinant of several child health outcomes and lifelong impacts on development and productivity (Nyaradi et al. 2013, p1). Nutritional deficit that happens in the period ranging between 6 to 2 years are critical given that it is a dietary transition period which is at the same time corresponding to significant physiological demands necessary for growth and development of the child (Gupta et al. 2016, p364) (Dewey & Adu-afarwuah 2008, P4)

To standardize complementary feeding practices, many organizations such as The World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) developed a guideline for optimal infant and young child feeding. According to the guideline, newborn and infants should be breastfed exclusively for the first 5 months (WHO 2007, P6). Thereafter, infants feeding practices continue with complementary feeding. The last is optimal when it providing adequate complementary food, and it is more beneficial when it is safe and timely initiated (WHO 2007, p6).

Researchers proved that inadequate feeding practices can vary from a delayed introduction of complementary feeding, inappropriate feeding frequency and low dietary diversity of complementary foods. the last lead to different consequences for the child development and growth (Dewey & Adu-afarwuah 2008, P44). The complementary feeding is recommended from 6 to 23 months a window within which interventions that target appropriate complementary feeding practices would lead to tangible benefits (WHO 2007, p6, Dewey & Adu-afarwuah 2008, p26-81). The literature implies that poor complementary feeding depends on the multifaceted causes ranging from maternal, child and environmental factors (Issaka et al. 2015, P669). Because potential risk factors for infants malnutrition in Rwanda can be among those mentioned in the literature, there is a need to investigate which of them is playing an independent role in suboptimal complementary feeding practices in Rwanda. The results of this study will fill the gap on the factors associated with the suboptimal complementary feeding in Rwanda; it will provide a support to decision making that can use it for evidence-based policing. Furthermore, this study can trigger other studies such as community-based randomized trial to see which strategy on complementary feeding practices can work better than the others. In this way, the

study will be contributing knowledge to expand the existing body of nursing knowledge. Therefore, this study becomes significant to nursing as a discipline as well. On nursing education, this study shall serve as a reference for integration of infants and children feeding practices in the nursing teaching program as this would impact on nursing practices.

Even if knowledge infant children feeding practices was not part of research objectives in this study, the results should be used to guide nursing practices in emphasizing on maternal education on infants and child feeding practices especially complementary feeding.

## **1.6. DEFINITION OF CONCEPTS**

### **1.6.1. Complementary Feeding**

In this study CF refer to the process of initiating other food than breast milk when the last is no longer meeting nutritional needs of the infants. The process includes the progressive initiation of semisolid to solid food in the infants' diet and this is done concurrently with breastfeeding. The process generally fit in the age range between 6 to 24 months (WHO, 2007, p5-8).

### **1.6.2. Complementary feeding indicators:**

It is a set of standardized measurements indicators for evaluation of the IYCF practices. Core indicators were published by the WHO and are recommended by the UNICEF(WHO, 2007, p5-8). In our context of this study, the core indicators are used to define the research outcomes in this study.

Feeding practice indicators are used to measure rates of compliance with recommended food groups. Many feeding practices indicators exist. However, for the purpose of this study the following complementary feeding practices were considered in measuring the rate of compliance among mothers/caregivers:

### **1.6.3. The introduction of solid, Semi-solid or soft food:**

This indicator depicts the percentage of infants and young kids between 6 to 24 month, who are introduced to complementary food at 6 months (WHO, 2007, P5-8)

### **1.6.4. Minimum dietary diversity:**

This indicator illustrate the percentage of children in age range of 6-24 months who are given at least 4 food group or more (including grains, roots/tubers, legume and nuts; milk products, fresh

food from animal source (e.g. organ meat etc), eggs, vitamin A rich food in the preceding day (WHO, 2007, P5-8)

#### **1.6.5. Minimum acceptable diet:**

It is a combined indicator that illustrates the proportion of infants and young kids in age range of 6 to 24 months who receive both minimum meal frequency and minimum dietary diversity the proceeding day (WHO, 2007, P5-8)

### **1.7.STRUCTURE/ORGANIZATION OF THE STUDY**

This research report is subdivided into six main chapters. The first one covers the introduction and background to the study and extends to the problem statement, research objective and research questions. The second chapter covered about the literature review and described the conceptual framework which guided this study. The third chapter described the research methodology used in conducting this study. The fourth chapter presents and discusses findings of the study. The chapter five covers summary, conclusions, and recommendations. References and annex are at the end of the document.

### **1.8. CONCLUSION TO CHAPTER ONE**

From the chapter one, it is clear that despite the guideline they are questions that need to investigated and addressed, the chapter described the objectives, research questions, and methods used to answer the identified search questions.

## **CHAPTER II: LITERATURE REVIEW**

### **2.1. INTRODUCTION**

In the last two decades, International facing to the challenges of malnutrition among children and associated risk factors. New evidence has emerged from research and a need for involving new players have come on board such as the Scale Up Nutrition movement (UN 2015, p52). In the same way, studies on the economic rationale for investing in fighting malnutrition have gained momentum. International organization pointed out the importance of putting nutrition at the center of development as reflected in UN Sustainable Development Goals (SDGs), which have putted tackling malnutrition at the center of its achievements (United Nations 2015, p10-12).

To address the issue of malnutrition, there is a need to uproot root causes which has multidimensional characteristics. Some of risk factors include poverty, access to land, the quality of drinking water , access to quality food ( quality and quantity)(Cumming & Cairncross 2016 p91-97). Studies also show that malnutrition is often exacerbated by poor feeding and care practices for infants and young children, poor or lack of women education, disease and poor health systems (Nakamori et al. 2010, p45). There is also a greater understanding regarding the importance of nutrition at different stages of the lifecycle and the impact of poor nutrition across generations (Nakamori et al. 2010, p27-31).

### **2.2. THEORETICAL LITERATURE**

#### **Malnutrition among under 5 years children: the magnitude and risk factors**

Childhood malnutrition is a public health concern and major risk factor for infant morbidity and mortality worldwide. Researchers estimated that 3.5 million of childhood mortality is in developing countries is a consequence of poor infant nutrition (Bantamen et al. 2014, p1). Report from international organization estimated that in 2012, worldwide about 162 99 million of under-five children had malnutrition in form of either stunting, underweight, or wasting and Asian countries contributed half of the figure (Panigrahi & Das 2014, p1). In 2013, about half of all stunted children lived in Asia and over one-third in Africa (WHO 2002, p2). In Asian countries under-nutrition among children differs across the continent and within the countries. For

example, in a study from a national representative data conducted in Bangladesh reported anemia cases among under 5 years children at 47.4% in urban area and 53.1 % in rural regions in Bangladesh (Khan et al. 2016, p1). In the recent past, a wide variation in the rates of malnutrition was documented in Nepal; within the Country, stunting was reported at 42% in rural children when urban it counted (27%). Wasting and underweight represented respectively 11% and 36 % (Singh et al. 2014, p1).

Under- nutrition among children is a concern in South American countries as well. As an example, a study conducted among Peruvian kids reported stunting at 24.2% and underweight at 8.6%. In the same region, Jason and colleague reported a stunting rate of 47% (Joseph et al. 2014, p5).

Countries in Sub-Saharan Africa are affected as well with malnutrition among under five years' children. Starting from Rwanda, a recent report from Rwanda Demographic and health survey informed that 38 % of under 5 years children are considered too *short for their age (stunted)*. While 2% of children in Rwanda are too thin for their height (Wasted), 9% of children are underweight (NISR 2015, p148). In the region, the malnutrition problem affects neighboring countries that include Tanzania. It was reported in a study conducted in 2015 that 26.1% of under five years children are stunted, 6.5% are wasted and 11.7% are underweight (Masanyiwa & Lwelamira 2016, p94). Uganda have the same problem, stunting among under 5 years represent 33% and underweight is at 14% (USAID 2014, p2).

There are several factors that are believed to be associated with malnutrition among children. Under-nutrition involves nutrients intake deficits which if not addressed can (beside mortality and morbidity) lead to significant delayed psychomotor and cognitive developments (Matrins et al. 2011, p1). The causes of poor nutritional status among infants and young children vary from socio-political and economic problems, which can contribute to food insecurity and lack of maternal and child care services. Other causes involve specialized determinants such as repetitive infections (Jones et al. 2014, P1). Acute undernutrition is often associated with short-term factors such as seasonal variation which lead to food shortage, shifts in social or economic policies, and the occurrence of illnesses beyond the expected level while its chronic form is associated with long- term risk factors (Egata et al. 2013, p2-8).

One of the most ignored risk factors to malnutrition is the feeding practices as done by mothers or caregivers to the infants and young children which can be influenced by socioeconomic demographic and socio-cultural factors (Pak-gorstein et al. 2011, 1-21; Panigrahi & Das 2014,

p1). In a study conducted in Uganda, it is documented that socioeconomic, poor knowledge on feeding practices and cultural beliefs are playing a role in predicting how good complementary feeding can be implemented (Nankumbi & Muliira 2015, p105). Complementary feeding as a progressive weaning process from breast milk is planned when the last is no longer sufficient to meet the nutritional requirements of the child. It necessitates an introduction of other food adapted to child development stage (Peres *et al.*, 2016, p 2).

The optimal age range for complementary feeding is between 6 to 23 months where it is believed that the child is neurologically able to chew, swallow, digest, and expel food product other than breast milk. to guide caregivers guidelines have been developed (WHO, 2007, p7; Saldan *et al.*, 2016, p5). However, despite guidelines, developing countries are still facing challenges related to either inadequate knowledge on infants feeding practices, poor dietary intake (Dewey & Adu-afarwuah 2008, p24-28). An additional source of inadequate complementary feeding can be the consequence of the poor timing (too early or too late), inappropriate feeding frequencies, method or poor hygiene, child health and child care practices (Dewey & Mayers 2011, p129-139). In developing countries where poverty interacts with ignorance and unhygienic food preparation lead to unsafe, poor dietary with little variety and few nutrients as compared to breast milk (Peres *et al.* 2016, p1-7). The poor quality and lack of diversity in foods adversely affect the children's growth and nutritional status (Millward & Jackson 2004, p388-405).

## **2.3. EMPIRICAL LITERATURE**

### **Complementary feeding and child Health**

Deficient CF practices have negative consequences on the infants' health and development, especially within the first 2 years of life (Cooke, McCrann and Higgins, 2013, p346). The age period is known as "the critical window" for the promotion of optimal child growth (Dewey and Adu-afarwuah, 2008, p25-81). The risks of nutritional consequences are at the highest level at 6 months especially when they do not receive sufficient quality and quantity of CF even for the kids who benefited from an optimal breastfeeding (Cooke, McCrann and Higgins, 2013, p5). The benefits of adequate complementary feeding are many and it is believed that around 6% of child mortality would be decreased with adequate complementary feeding (Cooke, McCrann and Higgins, 2013, p5). What is challenging with complementary feeding is the timing, the quality, and amount to give to the child. To make sure that people understand the same thing the WHO

made recommendations on CF. The recommendations are summarized in different indicators that are (a) **Introduction of solid, semi-solid, or soft foods** which counts the percentage of kids in age range of six to eight months who are fed with these foods; (b) **Minimum dietary diversity** which totalize the percentage of children in age range of 6–23 months who are fed with at least from four food groups. the food group recommended are shown on page 7 of the WHO, recommendations guidelines ”(1) grains, roots; and tubers; (2) legumes; (3) dairy products; (4) meats; (5) eggs; (6) vitamin-A rich fruits and vegetables; and (7) other fruits and vegetables”.(c) **Minimum meal frequency** which covers the percentage of children in 6–23 months of age who are fed with solid, semi-solid or soft foods, as well as milk-based foods for non-breastfed children, **Minimum acceptable diet**: percentage of children aged 6–23 months who are fed with a minimum acceptable diet (WHO, 2007, p7; Saldan *et al.*, 2016, p5). They are more other indicators, however, the most aforementioned indicators are the most used. What CF indicators share in common is the age range targeted (from 6 to 24 months of age). It is one of the most significant times periods for preventing childhood under-nutrition (World Bank 2006, p10). The child Growth problems mostly happen at this time period especially at the start of the complementary feeding (Dewey & Adu-afarwuah 2008) Which actually is a transition between low nutrient density and breast milk (Cooke, McCrann and Higgins, 2013,p346).

At 6 to 24 months of several competing factors including food contamination, the practices of hygiene, and digestive strangle increase the likelihood of diarrheal episodes (Dewey and Mayers, 2011,p129-140). Nutritional deficiencies that happen at this age stage especially stunting are hard to overturn, and this is why the period is seen as a critical window of vulnerability that can easily lead to irreversible child growth damage (Victora et al. 2010, p1-7). Additionally, at this age children have more nutrients demands as a result of increased energy requirements (Victora et al. 2010, p1-7) (Lozoff et al. 2006, p1-9). It was documented that some of the nutrients deficiencies can hamper neurological development and this is observed mostly in case of iron deficiency (Lozoff et al. 2006, p1-9). It is known that poor energies and protein intake make the child more vulnerable to continuous infection which turns into growth retardation (Rodríguez et al. 2011, p1). It is hard to know the effects of each micronutrients deficiencies that happen because of poor complementary feeding, but it is documented that the deficiencies are more prevalent in developing countries where, anemia as a consequence of inappropriate iron and vitamins intake is frequent (Burke et al. 2014, p4093-4107). The real causes of nutrients deficiencies are not accurately known but



regardless of the other mechanisms, poor complementary feeding that results in poor bioavailability is one of the most plausible causes (Bwibo & Neumann 2003, p1-5).

Child growth results from a combination of both genetics and nutrients' availability. For example, linear growth depends on cell proliferation, and when it involves bones and growth plate, the linear growth takes place (Gat-Yablonski & Phillip 2015, p715-535) (Bwibo & Neumann 2003, p22). Even if the full mechanisms behind child growth are complex all turn around genetics and micronutrients (Bwibo & Neumann 2003, p1-5). For example studies on animals showed that nutrition status affects growth hormones especially the low-level energy and proteins (Estívariz & Ziegler 1997, p65-70). Other soluble minerals like zinc are believed to play a role in cell growth as well and this suggests that its deficiency can easily lead to stunting (Gibson et al. 2007, p167). Other minerals and vitamins such as Vitamin D and calcium deficiencies were associated with diseases known as rickets (Abrams 2002, p111-115). From what is described in the literature nutrients (macro and micronutrients) deficiencies can expose to several nutritional mediated diseases. The relationship between diseases and malnutrition is bidirectional. when considering infectious diseases, when the child is frequently ill, this can impair nutritional status and poor nutrition can increase the risk of infection (Dewey & Mayers 2011,p129). In the context of developing countries where poverty, unfavorable believes and low level of education is frequent, the problem can be resulting from many different factors from poverty, food insecurity and more of how complementary feeding is implemented.

### **Infant and young child feeding practices**

The corner stone for good health and wellbeing is appropriate nutrition. There are appropriate diets for each age group throughout the life cycle. Appropriate nutrition in the first 1000 days (from conception to 2 years) is critical not only for the individual child but for the entire household community and national development later on (Victora et al. 2008, P340-53). Children who are not appropriated fed during this period miss out on reaching their full potential due to impaired cognitive and physical development (de Onis et al. 2007, p942-43). In addition they have an increased risk of developing non- communicable diseases later in life.

UNICEF and WHO recommend that infants should be exclusively breastfed for the first 6 months. Initiation of breastfeeding should also commence within one hour after birth. Breast milk contains all the nutrients the child infants needs for the first 6 months of life. Breast milk is also a source of antibodies, which provide immunity to common disease until the child develops

its only full immunity. Breastfeeding should be continued until the child is 24 months or more, when the child is fully weaned. After 6 months the mother's milk (quality and quantity) is not sufficient to sustain the nutritional needs of the infant (UNICEF 2012, p15).

Rwanda compared to other countries has made tremendous progress in practicing exclusive breastfeeding for six months. Exclusive breastfeeding in under- 6 months has increased from 38% in 2009 to 87 % in 2014% the highest in the world (NIS, 2015, p78). Globally, only 35% of under- 6 months are exclusively breastfed. Exclusive breastfeeding prevalence in neighboring countries namely, Burundi, Tanzania, Uganda and DRC range from 39 -70%.

WHO / UNICEF recommend an introduction of complementary feeding to infants aged 6-8 months. Infants are most vulnerable during the transition period when complementary feeding begins. Mothers and other family members need to ensure that their nutritional needs are met, which means that complementary feeding should be “1) timely – meaning that infants are introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding; 2) adequate – meaning that they provide sufficient energy, protein and micronutrients to meet a growing child's nutritional needs; 3) safe – meaning that they are hygienically stored and prepared, and fed with clean hands using clean utensils and not bottles and teats; 4) properly fed – meaning that they are given consistent with a child's signals of appetite and satiety, and that meal frequency and feeding method – actively encouraging the child, even during illness, to consume sufficient food using fingers, spoon or self-feeding” – depending on cues from the child ( what is suitable).

The recommended feeding schedule is that Infants should initially be fed 2-3 times a day between 6-8 months, the frequency should then be increase 3-4 times daily between 9-11 months and 12-24 months with additional nutritious snacks offered 1-2 times per day, as desired (Pérez Lizaur 2011, 56).

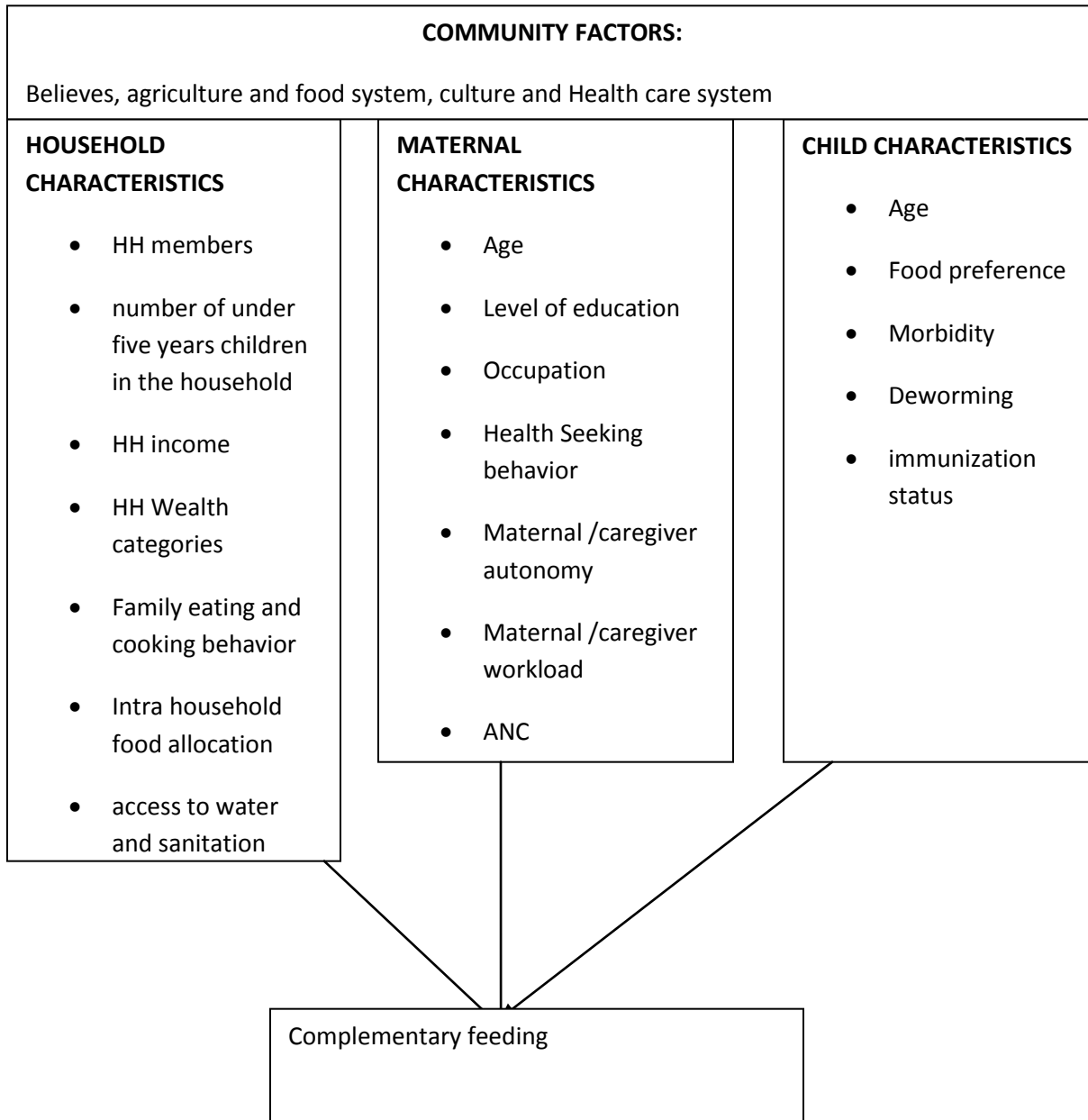
## 2.4. CONCEPTUAL FRAMEWORK

Complementary feeding is a progressive dietary transition that is represented by introduction of other food as an addition to breast milk when the last is not meeting the child nutritional demands. The complementary feeding is planned at age of 6 to 24 months (WHO, 2007, P5-8). The timing of complementary feeding initiation depends on the anatomical and physiological maturity of infants along with the nutrition needs (Scott 2001, p170). By the age of 6 months, the gastrointestinal track of the child is mature enough to digest and absorb micronutrients from the non-milk diet (Scott 2001, 2007, p170-2). Effective complementary feeding is a set of practices that counts several dimension ranging from the appropriate timing for initiation, food type and preparation, Dietary diversity, adequate amount and safe storage (Ruel et al. 2003, p2).

The literature suggests a relationship between household sanitation along with the practices of hygiene and malnutrition among under 5 years children (Rah et al. 2015, p1). The last relationship might be suggesting that the way mothers (caregivers) deal with hygiene expose the child to episodic infections which increase the childhood morbidity. The relation between infection and complementary feeding is complex, but more of complementary feeding fit into this age range and the risk of contaminated food is more likely to happen especially in the household with poor hygiene and sanitation. it is believed that infections would affect the infant appetite and hence compromise the complementary feeding practices especially when it is associated with fever, vomiting, and diarrhea (Dewey & Mayers 2011,p129-142).

From the aforementioned discussion, besides food insecurity and other socioeconomic factors, optimal complementary feeding can be affected by *Child factors*, *maternal factor*, and *Household factors*. Starting with maternal characteristics, for example, maternal socio-demographics such as age, occupation and education, knowledge on child nutrition etc. can affect the complementary feeding practices. From the child side (*child characteristics*), the ability to feed a child appropriately depends on child health status, child food preference as well as the appetite that the child has. A child suffering from different conditions such as enteric infection, diarrhea, Respiratory infections, malaria and other conditions do not eat easily and this affects her/his eating ability and hence feeding practices. Other important factors are related to

Household Characteristics. To provide, adequate food variety as required in complementary feeding, the household should not experience household food insecurity. Therefore, the conceptual framework assumes that household characteristics such as a number of under 5 years children in the household, wealth index, the source of income and household size, have an impact on the complementary feeding practices of the child.



**Figure 1 Diagram of relationship between potential determinants and complementary feeding**

## **CONCLUSION**

Chapter two, described the magnitude of the nutritional problem, the effects of nutrition on child health along with the knowledge gap in the literature, and showed how variables interact with complementary feeding.

## **CHAPTER III: METHODOLOGY**

### **3.1. INTRODUCTION**

The methodology chapter describes stepwise, the study design, the population and sample size, data collection tool, data collection processes, the predictors, data analysis and data management. As this study used a secondary data analysis, the description is based on the report from DHS 2014-2015

### **3.2. STUDY DESIGN**

This study is a secondary data analysis from Rwanda Demographic and Health Survey (RDHS) (2014-2015). This 2015 RDHS was a population-based cross-sectional study design. It is a countywide survey that is conducted every 5 years.

### **3.3. STUDY POPULATION AND SAMPLE SIZE**

DHS, 2014-2015 involved 12,792 households adequately selected to represent the urban and rural area. The study involved women aged between 15-49 years, and men aged 15-59 years. For the purpose of this study, the subpopulation of interest is woman /care givers who have under 5 years children.

To select the sample, the Rwanda Demographics and health survey used multi-stage sampling strategies. At the start, the village was selected as clusters. And household sampling was done with the probability proportional to the village size. Thereafter, a mapping process continued with a listing of all household in the corresponding Village. The list was then used as the sampling frame for a household to be involved in the survey. at the end the sample size of woman who have under 5 years children was 3615 of which 220 were aged between 6 to 8 months and 1117 children were aged between 6-23 months.

### **3.4. DATA COLLECTION TOOLS**

#### **Rwanda DHS, used classical data collection tool that are in three subunits**

Tools used in the 2014-2015 RDHS are respectively the questionnaire for *Household*, for *Woman* and the one for *Man*. both questionnaires are based on DHS international guidelines. The questionnaires were adapted to Rwandan context through participatory meetings with technical working groups. The questionnaire was developed in English but was translated into Kinyarwanda. The area that the questionnaires cover are described on page 7 of the full report (NISR 2015, p7). For the purpose of this study, the area of interest covers data on nutritional aspect of the kids and related covariates included into KR dataset.

#### **Reliability and validity**

The instrument is valid and reliable as it is World Health Organization standardized questionnaire and has been used by MoH, Rwanda biomedical center and National Institute of Statistics of Rwanda. This questionnaire related to complementary feeding has a content validity as considered information of the data set are those related to study objective and conceptual framework.

### **3.5 DATA COLLECTION PROCESS**

The data are available on the DHS web (dhsprogram.com) and were accessed through online application. in the application researcher was asked to provide a summary of the intended research project which was done. the application was successful and an access key was provided . with the key researcher was able to access the full database. Researcher extracted KR dataset which stands for Kids records along with HR ( which stand for household records )

#### **Outcome Variables (Dependent variables)**

Feeding practices encompass several indicators as mentioned in the feeding practices guideline by the World Health Organization. For the purpose of this study, the following complementary feeding practices indicators are serving as the study outcomes: *Initiation of solid* and *semisolid food* and *Dietary diversity*.

### **3.6 PREDICTORS (INDEPENDENT VARIABLES)**

Potential determinants of complementary feeding practices in this study are summarized in the conceptual framework of the study; they include variables from household characteristics, such as wealth index, the number of household members, the number of under 5 years children and access to water and sanitation. Other variables are parental related factors such as the level of education of the mother (or caregiver) education on nutrition, attending antenatal care and employment status. On the side of the child characteristics, factors like sex, morbidity (anemia, diarrhea, and fever), and immunization status were considered.

### **3.7 DATA ANALYSIS**

Data preparation was done using SPSS 20 version, and the techniques consisted in recording and replacing the variable of interest. For Descriptive results, frequency tables are presented for categorical variables. To test for the main research questions a bivariate analysis with Chi-square test was computed. To identify independent predictors a multiple logistic regression analysis was computed. The cutoff point for statistical significance was at least 0.1 for univariate analysis and 0.05 for the final model.

### **3.8 ETHICAL CONSIDERATION**

The RDHS 2014-15 was carried out by the National Institute of Statistics of Rwanda in collaboration with the Rwanda Ministry of Health and other partners. The protocol was approved by the National Ethics Committee of Rwanda and the ORC Macro Institutional Review Board (IRB) in Calverton, Maryland USA. Participants in the RDHS study signed a written informed consent. Additionally, this is secondary data analysis. The researcher contacted through email the owner of the database and the permission to conduct secondary data analysis was granted (annex). As requested the database is confidentially treated and no efforts will be made to trackback individual participants.



### **3.9 DATA MANAGEMENT**

The data used in this study is the property of the DHS Macro. Therefore, data were used only for the purpose of this study and were kept confidential during and after data analysis. The data set will be kept for 5 years.

### **3.10. LIMITATION OF THE STUDY**

This study was based on secondary data. Therefore there was no possibility of asking questions in case of need for more information. Additionally, the DHS is cross-sectional study. Therefore results from this study cannot establish a causal relationship. Finally, the DHS used a closed and open ended questionnaire, which is prone to socio-desirability bias. It is possible that participants reported the positive aspect of what was going on in the household instead of telling the truth. Therefore, the results from the study can over or underestimate what is going on in reality.

### **CONCLUSION**

The chapter provided the methods used from analysis to from study design to data management. It described the process through which the data were obtained and analysis process and ended up with limitation of the study

## **CHAPTER FOUR: RESULTS**

### **4.0. INTRODUCTION**

This section is presenting results from the data analysis; it starts descriptive results on the background characteristics of the participants, childhood morbidity, food category, hunger scale, it continues with factors associated with complementary feeding and discussion.

#### **4.1. BACKGROUND CHARACTERISTIC OF THE PARTICIPANTS**

The results on the background characteristic of the participants are summarized in Table 1. According to the table, above half of the participants (56.5%) were aged between 25 to 34 years followed with those who are 35 years old and above (24.7%). Participants in the age range between 15 to 24 years old represented 18.8% only. For residence, the majority of the participants were staying in Rural area (71.1%) and mostly married (80%). while above half of the participants do not have formal education (64%), those who completed primary education represented 29.2% followed by participants who completed secondary education and above (6.8%).

Results on marital status show that participants who have 2 children and less represent 88.9% and those who have 3-4 children are 10.9%. Results on household size inform that above half of the participants 58.7% have 5 at least 5 members and above. Results on nutritional counseling show that 70.7% of the participants attended nutritional counseling. With regard to employment status, 66.8% of the participants had at least one year long paying job, 24.4% had an occasional job and 8.9% had a seasonal job. From the results, the mass majority attended at least one antenatal care services (98.4%). According to the table participants who listened to the radio for at least once a week represented 79.8% and others listened to the radio less than once a week (11.9%) or do not listen to the radio at all (8.8%). Results related to wealth category shows that participants in the poorest category are 24.4%, and poorer was 21.1%. While middle class represented 18.8%, richer and richest represent 18.9% (Table1).

**Table 1:**Socio-demographic and economic status of the participant

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	<b>Frequency</b>	<b>Percentage</b>
<b>Maternal age /caregivers</b>		
15-24 years	681	18.8
25-34 years	2041	56.5
35 years and above	893	24.7
<b>Total</b>	<b>3615</b>	<b>100</b>
<b>Residence</b>		
Urban	783	21.7
Rural	2832	78.3
Total	3615	100
<b>Maternal marital status</b>		
Married	3115	86.2
Not married	500	13.8
Total	3615	100
<b>Education</b>		
No formal education	2313	64
Primary education	1057	29.2
Secondary and above	245	6.8
Total	3615	100
<b>Number of children (v137)</b>		
2 and less	62	2
3-4 children	1383	38
More than 5	2170	60
Total	3615	100
<b>Household members (v136)</b>		
1-4	3604	99.7
5 and above	11	.3
Total	3615	100
<b>Nutritional counseling (S561A)</b>		
<b>(missing data )</b>		
No	417	28.1
Yes	1068	71.9
Not at all	1485	100

**Employment (V732)**

All Year	4898	66.8
Seasonal	653	8.9
Occasional	1785	24.3

**Attended ANC (MV248)(missing)**

No	7	.7
Yes	765	99.3
Total	772	100

**Frequency listening to****Radio(MV158) (Missing)**

	246	8.8
Less than once a week	320	11.9
At least once a week	2299	79.3
Total	2865	100

**Wealth index (V190)**

Poorest	881	24.4
Poorer	762	21.1
Middle	679	18.8
Richer	608	16.8
Richest	685	18.9
Total	3615	100

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#### 4.2. RESULTS ON CHILDHOOD MORBIDITY

Results on child morbidity are summarized in Table 2. According to the table, participants reported that 18.9% of their under 5 year's kids had a fever, in the last 2 weeks that preceded the survey. And 12.7% of them had diarrhea. Respiratory diseases such as a cough (28.4%) and short rapid breath (45.2%).

**Table 2:** Childhood morbidity

---

	<b>Frequency</b>	<b>Percentage</b>
<b>Child had fever</b>		
No	2930	81.1
Yes	682	18.9
Total	3612	100
<b>Child had diarrhea</b>		
No	3156	87.3
Yes	459	12.7
Total	3615	100
<b>Had a cough</b>		
No	2584	71.6
Yes	1026	28.4
Total	3610	100
<b>Short rapid breath</b>		
No	562	54.8
Yes	464	45.2
Total	1026	100

---

#### 4.3. RESULTS ON FOOD CATEGORY PROVIDED TO UNDER 5 YEARS CHILDREN

Results on feeding practices as done by care providers are summarized in Table 3 show that 70.7% of care providers fed their kids with Starches and 65.2 % gave them legumes, routes, and nuts. With regard to dairy product, the results document that participants who afforded to provide dairy product were only 22.3%. While Eggs were fed to kids in 4.1% of the case, vitamin A rich foods were given in 36.6% of the case. Other fruits and vegetables were fed in 66.2%. While *Initiation to soft and solid food* was provided at 57% the *Minimum Dietary Diversity* was done in 36.2% of the case

Table 3: Participants who provided 7 food groups to their children

	Frequency	Percentage
<b>Group1 Starches</b>		
No	341	29.3
Yes	823	70.7
<b>Group2 legumes, routes, and nuts</b>		
No	406	34.8
Yes	761	65.2
<b>Group 3 Dairy product</b>		
No	896	76.5
Yes	261	22.3
<b>Group 4 fresh food</b>		
No	954	81.5
Yes	208	17.9
<b>Group 5 Vit A rich foods ( Eggs)</b>		
No	1118	95.5
Yes	48	4.1
<b>Group 6 Vit A rich foods</b>		
No	739	63.1
Yes	426	36.6
<b>Group 7 other fruits and vegetables</b>		
No	394	33.8
Yes	771	66.2
<b>Initiation to soft and solid food</b>		
Yes	1220	57
No	920	43
<b>Minimum Dietary Diversity</b>		
No	134	63,8
Yes	76	36,2

#### 4.4. RESULTS ON FACTORS ASSOCIATED TO INTRODUCTION OF SOLID, SEMI-SOLID OR SOFT FOODS

Results on factors associated with feeding practices are summarized in Table 4. According to the results, the following factors are associated with the introduction of solid, semisolid or soft foods; residence (Chi-square: 12.23,  $p < .001$ ), Marital status (8.547,  $p < .003$ ) and the number of under 5 years children (Chi-square: 14.004,  $p < .001$ ).

**Table 4: Bivariate analysis factors associated with introduction of solid, semi-solid or soft foods**

	Introduction of solid, semi-solid or soft foods			P-value
	No (%)	Yes (%)	Chi-square	
<b>Maternal age /caregivers</b>				.840
15-24 Y	63 (22.4)	218 (77.6)		
25-34 Y	153 (24.2)	480 (75.8)		
35 Y and above	55 (23.2)	185 (76.8)		
<b>Residence</b>			12.238	.000***
Urban	56 (16.7)	279 (83.3)		
Rural	216 (26.3)	604 (73.7)		
<b>Marital status</b>			8.547	.003**
Married	201 (21.7)	724 (78.3)		
Not married	71 (30.9)	159 (69.1)		
<b>Education</b>			3.086	.214
No formal education	177 (24.3)	552 (75.7)		
Primary education	73 (20.8)	278 (79.2)		
Secondary and above	22 (29.3)	53 (70.7)		
<b>Number of under 5 years children</b>			14.004	.001**
2 and less	232 (22.1)	816 (77.9)		
3-4 children	38 (36.5)	66 (63.5)		
More than 5	2 (66.7)	1 (33.3)		
<b>Household members</b>			.234	.629
1-4	115 (22.9)	388 (77.1)		
5 and above	157 (24.1)	495 (75.9)		
<b>Employment</b>			.687	.709
All year	86 (63.7)	49 (36.3)		
Seasonal	9 (69.2)	4 (30.8)		
Occasional	28 (58.3)	20 (41.7)		
<b>Frequency listening to Radio (MV158)</b>			.497	.780
Not at all	11 (68.8)	5 (31.2)		
Less than once a week	13 (59.1)	9 (40.9)		
At least once a week	76 (59.8)	51 (40.2)		
<b>Wealth index (V190)</b>			4.125	.389
Poorest	36 (66.7)	18 (33.3)		
Poorer	31 (64.6)	17 (35.4)		
Middle	22 (75.9)	7 (24.1)		
Richer	23 (53.5)	20 (46.5)		
Richest	22 (61.1)	14 (38.9)		

outcome : Introduction of solide and semisolid food , \* $p < 0.05$ , \*\*\* $p < 0.001$

**Table 5: Bivariate analysis on factors associated Introduction of solid, semi-solid or soft foods**

	Introduction of solid, semi-solid or soft foods		Chi-square	P-value
	No (%)	Yes (%)		
<b>Child had fever (H22)</b>			.014	.514
No	98 (64.1)	55 (35.9)		
Yes	36 (63.2)	21 (36.8)		
<b>Child had diarrhea (H11)</b>			2.890	.069
No	119 (66.1)	61 (33.9)		
Yes	15 (50)	15 (50)		
<b>Had cough</b>			.468	.295
No	84 (65.6)	44 (34.4)		
Yes	50 (61)	32 (34.4)		

, outcome : Introduction of solid, semi-solid or soft foods, \*p<0.05, \*\*\*p<0.001

#### **4.5. RESULTS ON FACTORS ASSOCIATED WITH PROVISION OF MINIMUM DIETARY DIVERSITY**

Results on the factors associated with the provision of Minimum Dietary Diversity are summarized in Table 5. According to the table, following factors were found associated with MDD:

Residence (Chi-square: 11.785, p<001), Education of the mother (care provider)(Chi-square: 54.879, p<.001) and wealth index (Chi-square: 72.340, p<.0001)



**Table 6: Bivariate analysis on factors associated with the provision of Minimum dietary diversity for children aged 6-23months**

	Provision of Minimum dietary diversity		Chi-square	P-value
	No (%)	Yes (%)		
<b>Maternal age /caregivers</b>			1.834	.400
15-24 Y	240 (85.7)	40 (14.3)		
25-34 Y	554 (88.5)	72 (11.5)		
35 Y and above	214 (89.2)	26 (10.8)		
<b>Residence</b>			11.785	.001**
Urban	274 (82.8)	57 (17.2)		
Rural	734 (90.1)	81 (9.9)		
<b>Marital status</b>			2.154	.085
Married	801 (87.3)	117 (12.7)		
Not married	207 (90.8)	21 (9.2)		
<b>Education</b>				
No formal education	668 (92.5)	54 (7.5)	54.879	.000***
Primary education	291 (83.1)	59 (16.9)		
Secondary and above	49 (66.2)	25 (33.8)		
<b>Number of under 5 years children</b>			1.601	.449
2 and less	911 (87.6)	129 (12.4)		
3-4 children	94 (91.3)	9 (8.7)		
More than 5	3 (100)	0 (0.0)		
<b>Nutritional counseling</b>			.580	.256
No	289 (88.9)	36 (11.1)		
Yes	693 (97.3)	101 (12.7)		
<b>Employment</b>			7.472	.24
All year	612 (86.1)	99 (13.9)		
Seasonal	80 (93)	6 (7)		
Occasional	236 (91.5)	22 (8.5)		
<b>Frequency listening to Radio (MV158)</b>			.497	.780
Not at all	11 (68.8)	5 (31.2)		
Less than once a week	13 (59.1)	9 (40.9)		
At least once a week	76 (59.8)	51 (40.2)		
<b>Wealth index (V190)</b>			72.340	.000***
Poorest	278 (95.9)	12 (4.1)		
Poorer	220 (94)	14 (6)		
Middle	186 (88.6)	24 (11.4)		
Richer	163 (84.9)	29 (15.1)		
Richest	161 (73.2)	59 (26.8)		

, outcome : MDD , \*p<0.05, \*\*\*p<0.001

#### 4.7. RESULTS ON INDEPENDENT FACTORS ASSOCIATED WITH PROVISION OF MINIMUM DIETARY DIVERSITY

Results on independent determinants on Minimum Dietary Diversity are depicted in Table 6. According to the table, people in the urban zone are more likely to provide the Minimum Dietary Diversity (OR: .530,  $p < .001$ ) as compared to those who stay in the rural area. Additionally, the level of education plays a role in predicting the likelihood to provide the Minimum Dietary Diversity. According to the table the more the mother (care providers) is educated, the more likely the child will be fed with Minimum Dietary Diversity. With regard to Wealth Category, results show that participants who are in comfortable socioeconomic status are feeding their children with minimum dietary diversity. The better the Wealth category the more likely parents will provide food in the respect of Minimum Dietary Diversity.

**Table 7: Multiple logistic regression analysis models for factors associated with the provision of MDD for children aged 6-8 months**

Variable	OR	95% CI	p-Value
<b>Residence</b>			
Rural	1		
Urban	.530	[.368; .765]	.001*
<b>Mother education</b>			
No formal education	1		
Primary education	.158	[.091; .276]	.000
Secondary education and above	.397	[.228; .694]	.001
<b>Wealth index</b>			
Poorest	1		
Poorer	.118	[.118; .226]	.000*
Middle	.174	[.209; .592]	.000***
Richer	.352	[.209; .592]	.000***
Richest	.485	[.296; .796]	.004**

Outcome variable” provision of MDD \* $p < 0.05$ , \*\*\* $p < 0.001$

## **CHAPTER FIVE: DISCUSSION SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

### **5.0. INTRODUCTION**

This chapter is presenting the findings as related to the context and available literature. Its offering a summary of the findings and make conclusions and recommendations for policy makers, researchers, nursing staff and other collaborators

### **5.1. DISCUSSION**

#### **Practice of complementary feeding**

In this study mothers (caregivers) were young adults mostly married and many of them had less than a primary level of education. According to our results, semi and semisolid initiation were done in 56.7% and Minimum Dietary Diversity *was met* in 36.2% of case of children who met the required age (6-23 months). Additionally, results from 7 food category as recommended by the World Health Organization illustrated that food that provides animal source proteins are less given to children. Results from this study corroborate with other study done in developing the world such as sub-Saharan Africa (Katepa-Bwalya et al. 2015, p1), India(Katepa-Bwalya et al. 2015, p554) and in Latin American(Katepa-Bwalya et al. 2015, p1180). Potential causes associated with inadequate complementary feeding differs across the world and count the limited knowledge related to infant feeding practices among mothers (or caregivers), the influence of cultural background, patterns and weight of other responsibilities the caregivers have in the household or outside (Nankumbi & Muliira 2015,p106). Others factors mentioned in the literature include the education level of the parents and the attendance of Antenatal care services (Khanal et al. 2013, p2). Additional factors reported in the literature are related to socio-economic status including household food insecurity (Singh et al. 2014, p3). To address issues of malnutrition among children in Rwanda, the government invested in tracking malnutrition through “*the 1000 days campaign*” (MoH, 2014, p1-14). The campaign is using several interventions and several other means. However, the malnutrition among under five year’s children is still at a higher level (38% for stunting) ( NISR, 2015, p147). In a study conducted on

behalf of the Ministry of Health revealed that 90% of mothers (caregivers) are aware of proper feeding practices that would enable the proper development of their children (WHO/UNICEF 2013, p51). Additionally, the latest RDHS2014-2015 documented that above 90% of pregnant woman attend antenatal care services which provide additional information to Infant and child feeding practices (Manzi et al. 2014, p2). Therefore, the results from the study suggest mothers (caregivers) have adequate knowledge on feeding practices that is not translated into appropriate feeding practices and this is a challenge to many communities (Khanal et al. 2013, p11-13).

## **5.2. DETERMINANTS OF FEEDING PRACTICES**

In this study, after controlling for potential confounders, Household characteristics that include residence, mother education, and wealth category proved to be independent predictors of Minimum Dietary Diversity as a complementary feeding indicator. As discussed earlier, several factors are influencing the feeding practices which include household socio- economic dimensions. In the context of this study people staying in the urban area, are the ones to meet the Minimum Dietary Diversity requirements. The same applies for wealth status, the more people are wealthier the more they meet the Minimum Dietary Diversity requirements. The mother' (care providers) education level proved to be playing a role as well. Results suggest that the more the mother is educated the more likely she fed her child with the Minimum Dietary Diversity. The results propose that socioeconomic status plays a role in feeding practices. Actually, the results show that the gap in feeding practices lies in the quality of meals given to the children. Because most of the participants are from the rural areas, it is possible that they rely on ordinary food based on vegetables. Children in such household would eventually be attuned into this regiment and eventually, the total number of animal sourced meals goes down. In addition, the majority of Rwandan citizens stays in rural and is subsistence farmers with not much income. As described in the literature, 44.9% of the Rwanda population lives below the poverty line (National Institute of Statistics of Rwanda, 2011). This proportion of the population mainly resides in the rural areas where the survey was largely based. It is therefore conceivable that majority of those interviewed may not afford to give their families which might be expensive to them as mentioned in other literature (Ijarotimi 2013, p130-132). Other potential factors mentioned in the conceptual framework were not found associated to the provision of the complementary feeding, particularly the provision of the minimum dietary diversity.

### **5.3. SUMMARY**

This study was conducted to identify the practices of complementary feeding and to identify factors associated with complementary feeding specifically initiation to semisolid and solid food and Minimum Dietary Diversity using a secondary data analysis from RDHS 2014-2015. From background characteristics, participants in this study were young adult mostly married staying in the rural area, having a low level of education and were in the lower level of wealth category. Less than 50% in this study had diarrhea, fever, cough and short rapid breath.

With regard to complementary feeding, this study informs that less than 50% of the participants provided animal source proteins to their kids and 57% of them timely initiated the solid or semisolid food. The minimum dietary diversity (which was one measure of compliance with recommended food) was provided in 36.2% of the case.

Results on independent determinants on Minimum Dietary Diversity showed that. The level of education plays a role in predicting the likelihood to provide the Minimum Dietary Diversity. The more the mother (care providers) is educated, the more likely the child will be fed with Minimum Dietary Diversity. With regard to Wealth Category, results show that participants who are in comfortable socioeconomic status are feeding their children with minimum dietary diversity. The better the Wealth category the more likely parents will provide food in the respect of Minimum Dietary Diversity.

## 5. 4. CONCLUSION

Most of the respondents were young adults, married and with primary education with the majority of them being housewives who have sometimes temporary jobs. Above half of the children had been introduced to complementary feeding although few benefited the Minimum Dietary Diversity which means that many children do not attain the minimum acceptable diet. Furthermore, the consumption of animal source foods, vitamin A-rich, and iron-rich foods was inadequate. With regard to the child, morbidity burden was high with diarrhea, fever, cough and short breath being most common. With regard to the factors related to complementary feeding practices, the following factors proved to be independent determinants: residence, marital status, mother education, and the wealth categories. Given above results, complementary feeding practices might be the reason behind the prevalence of malnutrition among children especially stunting.

## 5.5. RECOMMENDATIONS

**To the Ministry of Health and partners:** It is shown that food from an animal source is rarely given to children; we recommend that mothers and caregivers should think most often of food from animal source and vegetal diversification while preparing food for their children.

As most of the determinants to are socioeconomic related, the government with partners should address the socioeconomic matters by empowering families in encouraging income generating activities and through intersectoral collaboration.

**To health workers and nursing staff:** From the overall findings, complementary feeding practices are yet to meet standards, even if some of the determinants are beyond the control of health care provider, it is important to keep teaching and raising awareness from ANC services to the postpartum period. With the hope that woman (care providers will change the behavior)

**To researchers,** Additional recommendations go to researchers; because socio-cultural factors might be playing a role in the complementary feeding practices additional research focusing on a qualitative study to get more insight on sociocultural and behavioral factors behind the current complementary feeding practices. And this will help to develop and implement better strategy towards the improvement of the complementary feeding practices.

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ANNEX

**permission to use the data**