Associations between women's empowerment dimensions and Child diet diversity among Zambian children 6-23 months old

By

Patricia Sakala

A dissertation submitted to Trinity College Dublin in partial fulfilment of the requirement for the Degree of Master in Applied Social Research

Supervision by Dr. Philip Curry

April 2017

Declaration

This thesis is entirely my own work. It has not been submitted to this university or any other institution for publication. I authorise the University of Dublin, Trinity College to lend this thesis to other institutes or individuals for the purpose of scholarly research.

Signature:

I further authorise the University of Dublin, Trinity College to reproduce this thesis by photocopying or by other means, in total or in part, at the request of other institutes or individuals for the purpose of scholarly research.

Signature

ACKNOWLEDGEMENTS

It is my sincere honour and privilege to thank the people who were instrumental during the process of this study. I would like to thank the Irish government for support they provided towards my studies in Ireland and special thanks are due to the staff at the Irish council for international students for the prompt support they provided during my stay and study in Ireland.

Special thanks to Dr. Philip Curry for his prompt responses to all my queries, and helpful comments, without which this dissertation would not have been completed. A special thanks to Dr. Paula Mayock for her kind instructions throughout the course.

ABSTRACT

Women's empowerment is one of the nutrition sensitive intervention for addressing child undernutrition. Literature mainly from Asian countries indicates the existence of an association between women empowerment and child feeding. However limited literature exist to show the association between child diet diversity and women empowerment in Zambia. This study was designed to assess the association between women's empowerment dimensions and child dietary diversity among children 6 to 23 months old in Zambia. The study used secondary data collected for the 2013-2014 Zambia demographic health survey. The analysis targeted 3136 pair of the youngest child age 6 to 23 months old and married women age 15 to 49 years old living with their partners. Women's empowerment dimensions were identified from the data using principle component analysis. Multiple regression analysis was used to assess the associations between the women's empowerment dimensions and child diet diversity while controlling for the covariates. The study found that none of the three empowerment dimensions were associated with child diet diversity. However, a positive association was found between women's decision making empowerment dimension and feeding children on dairy products, and also a negative association was established between women's support for violence against women dimension and feeding children on starchy foods. These results suggests that women's empowerment programmes have a weak link with child diet diversity which might be associated with the limited integration of child nutrition programmes in women's empowerment programmes in the country. The study therefore, fills the knowledge gap on areas that should be targeted when linking nutrition programmes with women's empowerment programmes. The results suggests that women's empowerment programmes should strengthen women's decision making autonomy and women's self-esteem to contribute effectively to child diet diversity improvement.

Key words; Women empowerment dimensions; Child diet diversity; Child feeding; Child nutrition; Decision making dimension; Asset ownership dimension; Support for violence against women dimension .

TABLE OF CONTENT

LIST OF TABLES AND FIGURES

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CSO	Central Statistics Office
DALY	Disability Adjusted Years
DHS	Demographic Health Survey
FAO	Food and Agriculture Organization
FANTA	Food and Nutrition Technical Assistance
FHI	Society for Family Health
HIV	Human Immuno-deficiency Virus
IYCF	Infant and Young Child feeding
MOH	Ministry of Health
NFNC	National Food and Nutrition Commission
PCA	Principal Component Analysis
UNICEF	United Nations Children Fund
UNZAREC	University of Zambia Research Ethics Committee
VAD	Vitamin A deficiency
WHO	World Health Organization
ZDHS	Zambia Demographic Health Survey

CHAPTER 1. INTRODUCTION

Undernutrition among children less than 5 years old is one of the health problems affecting most developing countries (Black et al. 2013b). A number of factors have been associated with the state of undernutrition in young children, to this effect, countries implement different strategies to address the problem. This study was designed to assess the association between women's empowerment as a child nutrition intervention and child diet diversity among children aged 6 to 23 months old in Zambia. It also specifically assessed the association between women's empowerment and feeding children on foods from specific food groups.

This chapter provides background information to the study. It is structured into two main sections. The first section provides an overview of child undernutrition and the second part presents the problem statement which formed the basis of this study.

1.1. Overview of child undernutrition

Child undernutrition mainly manifesting in form of macronutrient (nutrients required in large quantities) and micronutrient (nutrients required in small quantities) deficiencies is a serious public health challenge among children less than 5 years old worldwide. The problem is most prevalent in children between 6 to 24 months of age when they are introduced to family foods. Globally 165 million (26%) children are stunted (height for age below -2 standard deviation (SD) of which 36% are in Africa, 101 million (16%) are underweight (weight for age below -2SD) and 52 million (8%) are wasted (weight for height below -2SD) (UNICEF, WHO & World Bank, 2012).

Sub Saharan Africa has the highest proportion of undernourished children in the world with more than 40% of children with stunted (low height for age) growth (WHO, 2010).

Other forms of undernutrition such as vitamin A deficiency, iron deficiency anaemia and zinc deficiency are also common among children less than 5 years. Worldwide, VAD and Zinc deficiency accounts for 9.9% of global childhood disability-adjusted life years (DALY) (the overall measure of disease burden, expressed as the number of years lost due to ill-health, disability or early death) and Iron deficiency accounts for 115,000 deaths and 20% of illness among the women of child bearing. Globally vitamin A deficiency (VAD) has been reducing and countries in Latin America have shown tremendous reduction. However, Africa still exhibits the highest burden, about 48% of children with VAD are in sub-Saharan Africa and it is reported to contribute to 95% of deaths due to diarrhoea and measles in children less than 5 years old (Stevens et al. 2015). Micronutrient deficiencies (inadequate intake of minute quantities) are a result of consumption of diets inadequate of vitamins and minerals (Branca, Piwoz, Schultink, & Sullivan, 2015). These deficiencies are among the world top ten burdens of disease and contributes to death among children and women (UNICEF et al. 2012).

Child undernutrition in Zambia

Zambia is one of the sub Saharan African countries that contributes the highest proportion of undernourished children in the world. Both micro and macronutrient deficiencies are high among children less than five years in Zambia. The Zambia Demographic Health Survey (ZDHS) report that 40% of children less than 5 years old are stunted and 54% of these are within 18 to 23 months while 4 % are less than 6 months old. In addition, it also shows that 15% of children less than 5 years old are underweight and 6% are wasted (Central Statistics office (CSO), Ministry of Health (MoH), ICF International (ICF), 2014).

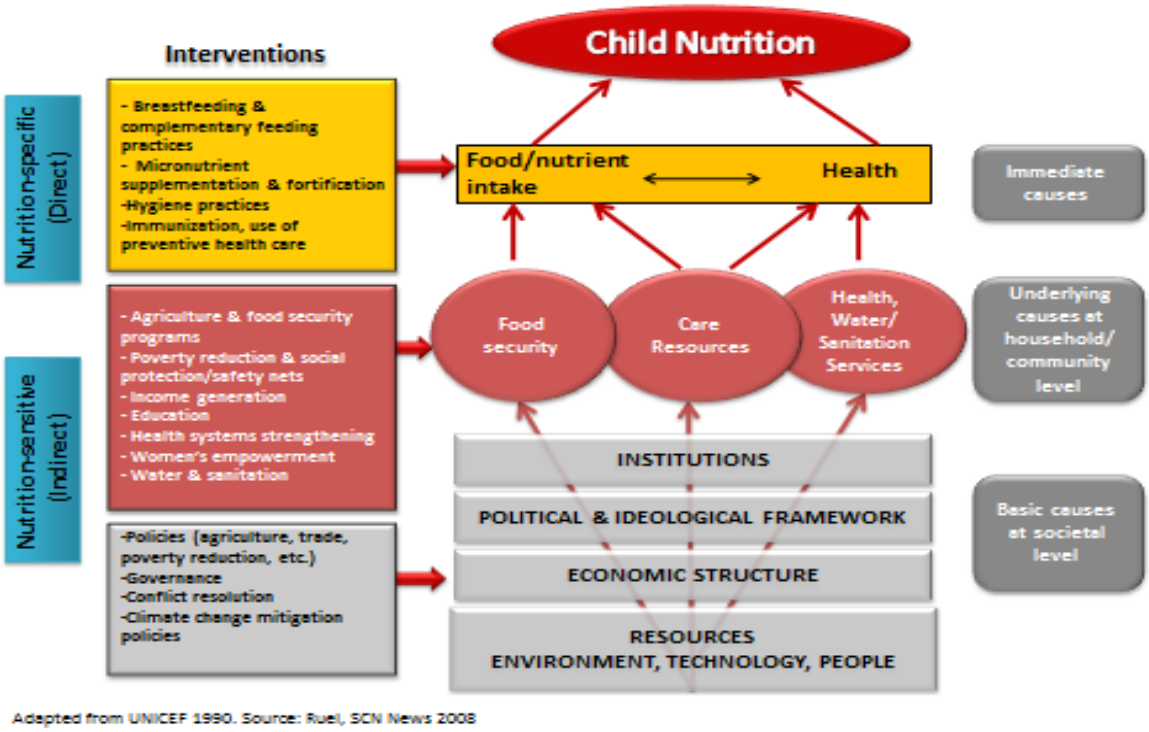
Further, an impact study done in Zambia to assess vitamin A deficiency among women aged 15 to 49 years old and children under five years old reported that about 53% of children 6 to 59 months old, and 14% of women were vitamin A deficient (NFNC, 2003). This finding was recently confirmed in a baseline study

for *the orange maize project* in Eastern Province in Nyimba district in Zambia which showed that 54% of children between 24-59 months were vitamin A deficient (Hotz, Palaniappan, Chileshe, Kafwembe, & Siamusantu, 2011).

Conceptual framework of child nutrition

Undernutrition is a multifaceted condition which results from simultaneous interaction of factors that affect the nutritional status at different levels. The conceptual framework (Figure 1.1) originally developed by UNICEF illustrates the multiplicity of factors that affect the nutrition state of children at basic, intermediate and at immediate levels. At the basic level, factors such as the environment, political and social systems influence the availability and access to potential resources that impact on child care resources (UNICEF, 1990). These conditions determine what kind of care is provided to the child and determines the kind of health condition in which the child would live at the intermediate level. These further determine the quality and quantity of foods the child can access in the household. At this stage, the food intake and the health situation work together to develop the child nutrition status (UNICEF, 1990). The combination of the above described factors make vulnerable populations become undernourished because they facilitate the condition where their diets lack foods such as fruits and vegetables, meats and fortified foods that are rich in the essential nutrients.

Figure 1.1: Conceptual framework of child nutrition



Adapted from UNICEF 1990. Source: Ruel, SCN News 2008

Consequences of child undernutrition

The state of undernutrition among children poses a great danger to children's lives and their future development. The condition weakens children's mental, health and physical growth which affects their achievements in all aspects of their lives (UNICEF et al.). Undernutrition in general is associated with growth retardation, permanent mental or physical damage and reduced physical activities which are evident even in adulthood. For further information on the consequences of undernutrition, see Victora et al. 2010; Dewey & Begum, 2011).

Interventions to address child undernutrition

Addressing undernutrition in many developing countries has been prioritised as one of the key development agenda. Countries put in place various strategies to implement the WHO recommendations for child feeding. One of the WHO recommendation for child feeding after six months states that children should be fed on a variety of family foods besides breast feeding at this age (World Health Organization, 2010).

These guidelines generally referred to as "optimal infant and young child feeding" (IYCF) were based on empirical evidence that optimal child feeding has the potential to reduce child undernutrition (Dewey & Afarwuah, 2008). The guidelines focus the interventions on the first two years of life as this period is identified to be a critical "window of opportunity" for better nutrition outcomes and growth development (Victora, de Onis, Hallal, Blossner, & Shrimpton, 2010). However, adherence to this recommendation has proved to be challenging in many developing countries resulting in limited diets given to children (Black et al). Assessments have shown that the main underlying challenge women face in child feeding after six months is the inability to access resources to provide adequate food for children due to high poverty levels (Katepa-Bwalya et al. 2015). Women are recognised as main child care providers and yet are the poorest segment of the society (Batana, 2013; Brown, Fieldstein, Haddad & Peña, 1995). Evidence shows that gender inequality, social norms and discrimination limit the ability of women to improve their welfare and contributes greatly to their poverty state (Malapit, Kadiyala, Quisumbing, Cunningham, & Tyagi, 2015). The cultural, economic and legal structures of the environment in which the women lives also restrict their control and autonomy over resources to adequately feed their children (Shroff et al. 2011). As a result, the women's poor status has been known to be a factor in poor child feeding practices and subsequent high prevalence of undernutrition.

Female empowerment has been identified as a key strategy for improving the women's status and that of their children, this is because it increases the women's ability to access and control resources that are critical in this regard (Van den bien, Qunsumbing & Gillespie, 2013; Malapit et al.). The review of evidence from 12 different studies on the association of women's empowerment and child nutrition demonstrated that higher levels of women's empowerment are generally associated with improved nutritional outcomes in children (Cunningham, Ruel, Ferguson & Uauy, 2015). This review also showed that different dimensions of

women's empowerment have different effects on child nutrition and may also provide mixed results depending on the differences in population characteristics, settings and methods used to measure women's empowerment. For instance, a study done by Na, Jennings, Talegawker & Ahmed (2015) in 10 sub-Saharan countries found divergent relationships between women's empowerment dimensions and child diet diversity depending on different countries across. Such divergent observations were attributed to differences in the cultural, economic, legal and social systems prevailing in the different countries. The results of these studies provides valuable information at a much broader level which can be used for programme design but it is still limited on the key contextual issues in specific regions that are important for child feeding at micro level. This is because cultural, social, economic and legal issues are different in different countries and their effect on women's empowerment varies.

1.2. Problem statement

Child undernutrition is a real developmental challenge in many countries and women's empowerment is promoted as a strategy to improve child feeding. The link between women's empowerment and children's nutrition and health has been well documented with many of the investigations done in Asian countries. However, Zambia is one of the countries advocating for women's empowerment strategy to reduce child nutrition. The ZDHS reports that 57% of the women in Zambia are empowered and yet 40% of the children in the country are undernourished and only 12% of the children are fed on the minimum diet diversity. This situation raises concerns as to whether the women's empowerment in Zambia has any effect on child feeding. Unfortunately, there is no literature to show such as association in the Zambian context as documented in other countries. In addition, no study has established the relationship between women's empowerment dimensions and feeding children on foods from different food groups. This gap in knowledge challenges development of comprehensive and nutrition sensitive women's empowerment interventions that can address specific cultural, social and legal issues that are important in the improvement of child feeding in the different communities. This research was designed to fill this

knowledge gap. The aim of this study was to establish the relationship between women's empowerment dimensions and child diet diversity among children 6 to 23 months old in Zambia. It also investigated the relationship between women's empowerment dimensions and feeding children on foods from the specific food groups. This study therefore, identified areas within the empowerment programmes that need to be enhanced for the women's empowerment programmes to contribute positively to provision of quality diet to children and reduction of undernutrition.

This paper is presented in five chapters. The current Chapter (one) provides an overview of the study done in this paper, chapter two provides a review of existing literature on women's empowerment and child diet diversity, chapter three presents the methodology used in undertaking the study, and chapter four presents the findings of the study. The discussion of the results of the study in light of the existing literature is presented in chapter five and chapter six provides the conclusions and recommendations of the study.

CHAPTER 2. LITERATURE REVIEW

Introduction

Women's empowerment is one of the nutrition sensitive programmes promoted in many countries that have embarked on scaling nutrition among children 6 to 23 months old. Zambia is one of the countries that is promoting women's empowerment as a child nutrition strategy. This study aimed at establishing the association between women's empowerment dimensions and child diet diversity among children 6 to 23 months old. It also assessed the association between women's empowerment dimensions and feeding children on foods from specific food groups.

This chapter provides a review of literature on women's empowerment and child diet diversity. The review is presented in three major sections. The first section provides a review of the child diet diversity and its associated factor. The second section presents the literature on women's empowerment as a child nutrition intervention and the last chapter provides literature on the relationship between women's empowerment and child diet diversity.

2.1 Child diet diversity

The conceptual framework presented in the previous chapter clearly demonstrated that food/nutrient intake has a direct influence on the nutritional status of the child. Consumption of a diversified diet (Combination of foods) is the only way the body can access the required nutrients because there is no one food that contains all the nutrients the body requires for its functions (Arimond et al. 2010). Children less than 24 months old particularly require a diverse diet that supplies the required nutrients to support growth and development. Therefore, it is recommended that these children are fed on diversified diets every day for them to receive adequate nourishment (FAO & FHI 360, 2016; PAHO &WHO, 2003).

Dietary diversity as defined by the Food and Nutrition Technical Assistance (FANTA) (2006) is a sum of different food groups consumed over a period of 24 hours. It is a proxy indicator used to measures the quality and adequacy of a diet (WHO, 2010). Diet diversity is defined as the consumption of foods from different food groups in order to meet the nutrient adequacy of an individual (FAO &FHI 360, 2016). The FAO &FHI 360 (2016) recommends that children six months and above must be fed on any 4 food groups out of the seven recommended food groups for calculating child diet diversity. The seven food groups recommended to meet child diversity includes Starchy foods, Legumes and nuts, dairy products, flesh foods, eggs, vitamin A rich foods and other fruits and vegetables. Each group makes a contribution to the provision of nutrients and comprises of different types of foods as discussed in Appendix 2.1.

Children who are fed on at least four of the seven groups of foods discussed above are said to be fed on the minimum dietary diversity. Meeting the required diet diversity among children 6 to 23 months has generally been a challenge in most sub Saharan countries. For instance, a longitudinal study which targeted children 6 to 12 months in Zambia reported a medium diet diversity of 2 (IQR; 2-3) (Mallard et al. 2015). Similarly, the CSO et al (2014) reported that only 11% of children between 6 to 24 months old were fed according to WHO infant and young child feeding (IYCF) recommendations. Related finding have been documented in other African countries. A secondary data analysis in Ethiopia showed that only 12 % of children received the minimum dietary diversity 24 hours prior to the interview (Beyene, Worku, & Wassie, 2015). Na et al. (2015) also found that the diet diversity among children 6 to 24 months in the sub-Sahara ranged between 1.4 for Bukina Faso to 2.7 for Benin and Rwanda. However, higher dietary diversity for children 6 to 23 months has been reported in other countries such as Sri Lanka (71.0%) (Senarath et al. 2012) (Kabir, Khanam, Agho, Mihrshahi, Dibley, & Roy 2012).

The literature shows that feeding children on minimum diet diversity has been challenging as evidenced by the low diet diversity in many countries.

Literature generally shows that child diets diversity is affected by a number of child's own characteristics, household's demographic factors and parents' characteristics as discussed below.

2.2.1. Factors affecting child diet diversity

(1). Childs' own characteristics

Biological factors such as age, sex and birth weight or size of the child at birth have been documented to affect children's' diet in many aspects. Na et al. and Beyene et al. (2015) in their DHS secondary analysis in sub-Sahara and Ethiopia respectively established that age of the child was a predictor of feeding diverse diets to children. The studies found that children between 12 -23 months were likely to be fed on a more varied diet than those between 6-11 months old. Similarly, high child diet diversity was observed among children between 12-17 months old in Zambia (CSO et al). In addition, Malapit & Quinsumbing (2015) found that boys were likely to receive a varied diet than girls in farming households in Uganda.

Other studies have found a strong association between child birth order and child diet diversity. Children born from the second order onwards tend to have a better chance of being fed on varied diets than the first borns' (Beyene et al. & Aemro et al. 2013).

Further, a study in Illinos which examined the role of parental perception of the child's weight in the first 2 years-of-life on infant feeding practices and child diet among children 22 to 63 months showed that children who were regarded non-overweight by the parent in the first 2 years of life received a higher mean daily total fatty/sugary food intake in their first 24 months of life. The study claimed that parental perception of child weight in the first 2 years-of-life was a risk factor for unhealthy child diet (Musaad, Donovan, Fiese, & STRONG Kids Research Team 2015).

(2). *Household characteristics*

The woman's response to recommendations from various strategies that promote good child feeding are influenced by the location of the household, societal and political levels factors in many ways (UNICEF, 1990).

(i). Household location

The location of the household affects the women's ability to feed their children. Literature shows that women are likely to feed their children on a more diverse diet in households that are located in places with well-developed infrastructure that provides the different types of foods recommended for child feeding (Stewart et al. 2013). The CSO et al. and Beyene et al. reports that children in urban areas are likely to be fed on a variety of foods than those in rural areas.

However, children in poor rural areas are mostly disadvantaged because most families in the rural areas depend on own food production (FAO, 2011a). This means that households with limited food production will have limited variety of foods available (Malapit & Quinsumbing, 2015). For instance, agricultural production in Zambia is concentrated on maize, locally grown vegetables such as dark green vegetables and legumes. Poor farming households who are unable to diversify their production feed their children on diets limited to these foods (Chapoto et al. 2015). Halimatou, Kohler, Taren, Mofu, & Chileshe (2014) claimed that the diets of Zambian children were mainly vegetarian. Similarly, the CSO et al. found that 67% of children were fed on starchy foods in form of porridge made from either cereals or root and tubers. In Zambia, mothers introduce starchy foods to children when they are 3 weeks old and 50% of children 6 to 23 months old were fed on Vitamin A rich foods old (CSO et al.). Similarly, legumes consumption is usually high among the community because legumes are locally produced and are a cheaper source of protein than meat in Zambia. Beyene et al. also reported that more than half of the children in Ethiopia were fed on legumes. However, a lower consumption of vitamin A rich foods was reported in Ethiopia (14.2%) among children 6 to 23 months' olds (Beyene et al.).

On the other hand, rural farming households that diversify their production feed their children differently. For instance. Wyatt et al. (2015) found that household production of dairy animals was associated with feeding children on dairy products. Their cross sectional study among the dairy farmers in Kenya revealed that children from high dairy production areas were 12 times likely to be fed on cow's milk. The study also found that children who were fed on cows' milk had a higher diet diversity than those that were not.

(ii) Household wealth.

Literature has documented the effect of the wealth of the household on child diet diversity. Lannoti, Robles, Pachon & Chiarella (2012) and Smith and Haddad (2015) argued that the wealth of the household commands the kinds of foods accessed by the household. Poor households have been reported to be vulnerable to food insecurity and their diets are limited in variety resulting in more undernourished children (CSO et al.). This is because they lack adequate resources to purchase the essential foods required for good nourishment of the children (Malapit et al.). Therefore, poor women and poor households avoid purchasing foods known to be expensive for child feeding. For instance, milk and milk products, eggs, other vegetables (exotic vegetables) and flesh foods are important source of protein and other nutrient recommended for child feeding and yet they are often expensive (WHO 2010; Bertazzo, Ragazzi & Visioli, 2016).

Consumption of foods known to be expensive is usually limited in poor households. For instance, CSO et al. found that only 4% of the children were fed on milk and milk products and majority of those that ate these products were from urban areas. Similarly, only 27% of children in Zambia are fed on flesh foods. Related results were also obtained in the secondary data analysis of the Sri lanka 2003-2007 DHS (Senarath, 2011). The study found that flesh foods contributed very little to the nutrient intake among children 0-59 months. Similarly, another cross sectional study in Ethiopia found that only 2.4% of the children in that country were able to eat flesh foods. The consumption of eggs among children is reported to be very low among children. The CSO et al. found that only 17% of the children 6-23 months old were fed on eggs. Halimatou et

al. (2014) indicated that animal sources of food contributes only 4-5% of energy in the diets of children in Zambian. A study conducted by Beyene et al. in their secondary data analysis of the DHS in Ethiopia also established that only 11.7% of the children 6-23 months were fed on eggs. Further, feeding children on other fruits and vegetables has been found to be relatively low among young children. The ZDHS found that only 27% of children 6 to 23 months old were fed on other fruits and vegetables (CSO et al.) and Beyene et al reported that 7.4% of the children in Ethiopia were fed on food in this group.

The low consumption of these foods could be explained by the high prices for these crops (Kearney, 2010). Lannotti et al. (2012) and Black et al. noted that the rise in the food prices on various commodities may affect the good quality foods that are required to provide a variety of nutrient to children. This situation may reduce the ability of the poor to access a variety of essential foods for the child's diet. Such as a situation is compounded by high unemployment levels common in most developing countries (Chigunta & Mwanza, 2016).

(iii) Norms, traditional beliefs and cultures

Social structures in the households defines what foods are made available in the households and how this food is distributed among the household members. Such systems are usually influenced by the existing norms, beliefs and traditions of the society (Smith & Haddad, 2015). These norms and traditions may at times limit feeding of certain foods to children which limits their diet diversity (Nankumbi & Muliira, 2015; Blaney et al. 2015). For example, a qualitative study done in Zambia among the women of child bearing age revealed that mothers gave starchy foods to children as they believed that it made the children satisfied and they stop crying too much. Another qualitative study in Egypt found that mothers valued feeding children on starchy porridge early in life because they considered it as a traditional food and they believed that no child would survive without it (Kavle et al. 2015).

(3). Parental Characteristics.

(i) Mother's education

The education status of the mother both formal and informal types has been established to be an important predictor of child diet diversity. Beyene et al. and CSO et al. found that mothers who attain secondary education and higher have a higher chance of feeding diversified diets to children than the uneducated mothers, a finding they attributed to awareness of the feeding pattern and higher empowerment. Literature shows that limited understanding on the nutritional needs of the child lead mother to sub-optimally feed the children (Victora et al.). Studies have shown that uneducated mothers base their child feeding practices on beliefs and taboos common in their society Kabir et al. 2012; Joshi, Dibley, Senarath &Tiwari, 2015). However, mothers who have not attained higher education receive health education talks and messages on child feeding provided through various mechanisms such as radios, televisions, anti-natal care services children's clinics (Stewart et al.; Bhutta et al. 2013). Studies have found that mothers who are exposed to media programmes are likely to feed their children on nutritious foods (Semahega, Tesfaye & Bogle 2014; Vitta, Benjamin, Pries & Zehner, 2016).

(ii) Health status of the mother.

The health condition of the woman may affect the ability of the woman to utilise the available resources to provide better child feeding. Women with chronic diseases such as HIV/AIDS, mental health, Tuberculosis etc. may have limited strength and power to make important decisions that support child feeding. Most of their decisions are made by other people in the household. As such, children living with sick mothers have been found to have a poor dietary diversity (Lartey et al. 2014). Further, one of the strategies provided to prevent mother to child transmission of HIV involves counselling mothers to opt to breastfeed or not. Mothers who opt not to breast feed their children are advised to feed them on milk products which they continue providing to the children even when they are eating other foods (WHO, 2012; WHO &UNICEF, 2016). As a result children who

are not breastfed are likely to be fed on milk products than the children who are breast fed, therefore, their diets have been found to be more diverse than children who are breastfed (CSO et al.).

2.3. Women's empowerment intervention to address child diet diversity

Women's empowerment is one key nutrition strategy currently under promotion to improve child nutrition (Ruel, Alderman & Maternal and Child nutrition study group, 2013). Some of the women's empowerment strategies employed includes; girl child education programs, gender equality sensitization, and provision of financial resources to enhance their potential; community awareness campaigns and gender equality advocates (Black et al. 2013a). Indirect women's empowerment interventions includes enacting and reinforcing laws that prohibit gender discrimination, promotion of women's participation at all levels, provision of microfinance such as cash transfers (Smith Ramakrishnan, Ndiaye, Haddad, Martorell, 2003). Generally, these programs enable women to have access to and control over resources and make important decisions that affect their wellbeing.

Conceptualization of Empowerment

Empowerment is one of the strategies designed to reduce poverty and increases the human capital of the most vulnerable population in many countries (van den bien et al. 2013; Malapit & Quinsumbing, 2015). Kabeer (1999; 437) defined empowerment as the *'expansion in people's abilities to make strategic life choices in a context where this ability was previously denied to them'*. Central in this definition is the concept of '*ability'* which is a prerequisite of the state of being empowered. Kabeer (1999) emphasised that ability can only be possible if one has the power to use what is available *'resources,* by being actively involved 'a*gency'* and getting that which is desired ' *achievement'.* Therefore, it was concluded that ability was only possible if resources were available and one was actively involved in the transformation process of achieving the desired goals.

The resources such as human, material and social resources are considered as prerequisites to empowerment because no empowerment can take place in their absence. However, the access to such resources is influenced by existing norms and rules in the society which are controlled by authorities of the land (Kabeer, 1999). Therefore, cultural issues play an important role in the empowerment which makes it very difficult to generalize empowerment across settings.

Agency refers to setting goals and working hard on them. This factor mainly displays the meaning of ones 'actions, the motivational factors behind ones' actions and the importance they attach to their actions. According to Kabeer (1999), this dimension of power goes beyond decision-making as it encompasses other qualities such as bargaining, consultations, trickeries and manipulations which can be done individually or collectively. Such factors can have both positive and negative consequences on power as it can enable people to work on their goals or hinder others from achieving their goals. Therefore, it also implies that empowered people act without fear to achieve their set goals as they may need to go against certain rules and norms without concern of what others may think of them.

Kabeer (1999) agreed with Sen (1984b) that the combination of agency and resources gives people the capabilities of being and doing things the way they would like them to be. This conclusion placed capabilities as an outcome of power through use of resources and agency as key in the empowerment process.

In recent years, female's empowerment has generated much interest in the development arena because it has been realised that it has the potential to bring about development and also reduce some of the problems associated with poverty (Malapit & Quinsmbing, 2015). In addition, the documented low status of women not only affects them personally but has far reaching effects on the intergenerational poverty and poor health. Therefore it has been realised that empowered women are able to use the existing resources to advance their plans

and achieve the goes that benefit the vast majority of the population (World Bank, 2010).

A review by Malhotra & Schuler (2005) on women's empowerment research is gaining consensus about the conceptualization of empowerment. Malhotra & Schuler, 2005 identified two important fundamentals - the 'process or change' and 'agency'- as being consistent in most women's empowerment research. In line with these principles, Hashemi & Schulers (1993) identified the following factors to generally describe women's empowerment.

(1) Sense of self and visions.

This factor measures assertiveness and actions to show the woman's sense of security and avoidance of social norms that hinder the achievement of their desired goals. This dimension enables women to work harder to be self-reliant in their action which provides them a sense of security.

(2) Mobility and visibility also referred to as mobility of the women.

This factor gives women the freedom to access the available resources not only within a limited apace but can expand their space to look for resources that can help them achieve their goals.

(3) Economic security.

This factor includes issues of ownership of property and other economic assets. In line with this dimension, empowered women have the ability to own their own resources that improves their economic situation. The resources they own are directly under their command and can be used by them in any way they like without being in fear of any one.

(4) Decision making dimension.

It entails greater women participation in household's decision making such as allocation of resources and control of money and purchases in the households.

(5) Political awareness and ability to interact freely. This dimension is closely linked with mobility but it involves participation at a lower level such as a households (Malapit & Quinsumbing, 2015). Empowered women are able to work around the politics of the household and society to get what they need for their development.

(5) Participation in non-family groups in the community such as community groups.

Empowered women can have full participation in platforms that discuss matters that not only affect them but the whole society at large and they contribute to development at higher levels.

Literature shows that the women's empowerment dimensions outlines above entrusts women with a significant role in the provision of household's food security and child outcomes. Women with a higher status in society have been found to have autonomy over resources in the households, enjoy better health and nutritional status and feed their children better (Smith et al. 2003). It is these process which affect the utilization of available resources either in the household or in the community for better child feeding.

The dimensions discussed above relate to a wide range of development indicators and researchers have used them to explain the association between women's empowerment and a range of development indicators. Women's empowerment factors identified to be related to child nutrition include economic (Access and control of financial resources); decision making (ability to make decisions that affect their wellbeing on themselves or jointly), social dimensions (the freedom of movement and relationship with other people in the society) and legal (access and ownership of assets) dimensions (Malhotra & Schuler, 2005. The next section provides further evidence of the relationship between these women's empowerment and child diet diversity.

2.4. Relationships between women's empowerment and child diet diversity

Studies on the relationships between women's empowerment and child diet diversity have demonstrated the existence of relationships between specific dimensions such as economic dimension, decision making dimensions, physical violence or social dimensions and ownership of assets. Evidence shows that empowered women have control over the household resources and can channel them towards child feeding (Shroff et al. 2011; Bose, 2011; Smith et al.; Black et al). The following section discusses evidence of the associations between some of the women's empowerment dimensions and child diet diversity.

Economic women's empowerment and Child diet diversity

Economic women's empowerment includes women's possession of resources that can be used in child feeding. Cross sectional studies in Ethiopia (Beyene et al) and India (Shroff et al) demonstrated that women with financial autonomy feed their children on diversified and adequate complementary foods which enables them to raise less malnourished children. Na et al. in their study of the association of women's empowerment and IYCF across 10 sub Saharan countries confirmed that women's economic empowerment domain is the most important predictor of child diet diversity.

In addition, specific women's economic empowerment programmes have also shown positive association with child feeding. For instance, Leroy, Ruel, & Verhofstadt (2009) in their evaluation of the microfinance credit programmes found that women who received microfinance credits for agriculture provided diversified diets to their children than those that did not. This is because the funds enabled women to grow a variety of foods that they were able to feed their children on.

On the contrary, economically empowered women were found to likely feed children poorly because they worked outside homes and entrusted child care to people who may have cared less about feeding in Bangladesh (Bhagowalia,

Menon, Ouisumbing, & Soundarajan, 2010; Schuler , Islam & Rottach, 2010; CSO et al; Cunningham et al. 2015 ; Nair, Ariana, & Webster, 2014). This was attributed to the assumption that care givers were not feeding the children the food provided in the home (Cunningham, et al; Nair et al. 2014). In addition, it was concluded that since empowered women most times work outside the home, they may have had limited opportunities to try different kinds of foods to feed the children when they refuse to eat other kinds of foods. Therefore, economic empowerment can negatively influence child diet diversity if other requirements for support child feeding are not put into consideration.

Further, a review of evaluation of cash transfer programmes in Mexico showed that the programmes improved households' and women's purchasing power thereby increasing the household ability to purchase different types of foods. These programmes were found to impact differently on feeding child on different type of foods. The study revealed that younger children (6 to 24 months) in rural Mexico increased their consumption of fortified foods, Iron, Zinc and vitamin A rich foods while those in the urban areas had a reduction in energy foods, Zinc foods and only increased consumption of iron rich foods. No effect was found on consumption of vitamin A rich foods and overall dietary diversity. The study concluded that the improvement in the diversity was mainly due to consumption of fortified foods and not the normal child diet (Leroy, et al. 2009).

The literature generally shows that economic women's empowerment increases the women's resource base that enables them to access different foods for child feeding. However, economic empowerment itself can also negatively affect the caring resources that influence child diet diversity. This implies that even economically empowered women may provide poor diets to their children.

Decision making domain and child diet diversity

The effect of decision making on child feeding has well been documented. Malapit et al. in their study of the important women's empowerment dimensions agriculture index (WEAI) revealed that none of the four empowerment

dimensions in their study were associated with child dietary diversity of boys but credit decision were associated with higher dietary diversity among girls though agricultural production decision negatively affected girls diet diversity. In addition, a lower gender parity was associated with less diet diversity for girls. They concluded that girls in household were women where empowered in agriculture were likely to be fed less varied diets than boys.

On the contrary, a secondary data analysis in Ethiopia showed that the four women's empowerment dimensions which included women's autonomy in agriculture, ownership and disposal of assets among women, income use and control among women, group leadership and allocation of time or household activities were associated with increased child dietary diversity and the mother's dietary diversity (Feiruz & Fanaye, 2015; Yimer & Tadesse, 2015).

The literature generally points to the fact that the effect of decision making on child diet diversity may vary depending on the areas of the study and also the targeted population.

Social empowerment dimensions and child diet diversity.

The social dimensions of women's empowerment includes items on women's opinion towards beating of the woman by the partner. Amugsi, Mitelmark & Odura (2015) in their secondary analysis of the Ghana DHS for the association of women dietary diversity and child dietary diversity showed that women's opinion of wife beating had an association with child diet diversity. Their study revealed that as women disapproved the beating of wives for any reason, the diversity in the diets of their children increased. Similarly, a Bangladesh study of the link between child nutrition and women's attitudes toward violence, decision making authority, and freedom of movement showed that women who were empowered to reject violence towards women provided more varied diet to children than those that supported it (Bhagowalia et al. 2010). Similar findings were observed in Uganda where women who disapproved domestic violence and had freedom of mobility had a higher chance of feeding their children better than those that

were less empowered (Shroff et al). Further, Na et al. found that the social familial domain of empowerment which included physical violence on women was negatively associated with dietary diversity of children. In this study diet diversity of the children was low when women supported violence.

Further, Asling-Monemi, Peña, Ellsberg, & Persson (2003) in their studies on violence against women and risk of child mortality in Nicaragua, showed that sexual violence stressed the women and negatively affected child care giving behaviours and practices that affected child feeding.

The review has demonstrated that empowerment of women to reject violence increases the child diet diversity, demonstrating the importance of the social dimensions of women's empowerment in child diet diversity.

Overall empowerment and child diet diversity

Studies that measured overall empowerment use all the women empowerment items in the DHS to come up with overall empowerment. Bhagowalia et al. in their Bangladesh analysis of the DHS found that less empowered women had less time to feed their children well and lacked adequate resources to provide the varied diets for themselves and their children. This was because disempowerment limited the resources that the women had in control and they always relied on someone else to make important decision that affected their diets and that of their child. Similarly, a study in Liberia showed that disempowered women were likely to experience physical violence which affected their own dietary diversity and that of their children hence resulted in poor nutritional status of children (Sobkoviak, Yount, and Halim, 2012). Further, Na et al. in their assessment of the association between women's empowerment and IYCF found significant relationship between women's empowerment and child diet diversity in three out of the ten countries included in their sample. Their study showed that children whose mothers were empowered were almost two times likely to be fed on a varied diets in Bukina Faso, Mali and Sierra Leone.

The literature reviewed provides clear evidence of the association of women's empowerment and child diet diversity. However, mixed findings and major variations are also evident on the effect of the overall empowerment in most studies. This indicates the effects of the contextual differences of empowerment indicators because the items used to measure empowerment can have different results depending on how sensitive the items are on the test indicator and the social cultural and legal systems in the study area. Therefore, assessment of women's empowerment can have different effects in the context in which they were done so that it reflects the inherent norms of the regions to improve child nutrition (Paul et al. 2011). Though these studies provide valuable information, most of them were done in the Asian rather than African countries with a few exceptions. However, no representative study has been done on the association between women's empowerment dimensions and feeding children on the specific food group to children. This information is necessary in guiding the design of women's empowerment programmes that should contribute to increased consumption of certain foods to improve the child diet diversity. Further, the association of women's empowerment and child dietary diversity has not been explored in Zambia. It is this knowledge gap that this study fills in the body of knowledge.

CHAPTER 3. METHODOLOGY

Introduction

This chapter provides a detailed discussion of the research methods used in undertaking this study. The aim of this study was to

1. Assess the association between women's empowerment dimensions and child diet diversity.
2. Investigate the relationship between women's empowerment dimensions and feeding children on foods from specific food groups.

The chapter is presented in four sections; the first section provides details on data access, sampling and sample description. The second part provides detailed discussion of the measures used in the study and how they were developed. The third section provided the logic of the data analysis, and ethical issues are discussed in the fourth and last section.

3.1. Study data and sampling

The study utilized secondary data collected for the 2013-2014 Zambia demographic healthy survey (ZDHS). The ZDHS is a cross sectional nationally representative survey which collects data every five years in Zambia. Cross sectional data was considered appropriate for this study because the study aimed at examining associations which could only be established using cross sectional data (De Vaus, 2013). In addition, the data set contained data on women aged 15 - 49 years old and children aged between 6 to 23 months which meets the set target population for the study.

Further, the ZDHS collected data on women's empowerment items and children feeding which were relevant for this study. It also had demographic, individual child and mother variables that were important in mediating the relationship between women's empowerment dimensions and child diet diversity. Furthermore, the data set was available through an online application to USAID data achieve (measure DHS) and accessed through CSO (Zambia) as an anonymised micro data file in SPSS format.

Upon accessing data, further data selection was done by limiting the variables that were relevant for the study. Information retained for analysis included a wide range of potential independent variables such as socio-demographic household characteristics, mothers and the children's characteristics. The ZDHS sample was selected using a stratified, two stage cluster design, and enumeration areas were the sampling units for the first stage. Data was collected from households which comprised secondary sampling unit. In order to adjust for complicated designs, all the analysis in the descriptive statistics were weighted using the women weighting variable which was provided in the data set.

Sampling

The study was restricted to married women aged 15 to 49 years old and their youngest child aged 6 to 23 months old. The youngest child in the household was targeted in this study because the current focus of child nutrition interventions is on children 6 to 23 months old because this is the age group with highest undernutrition (Black et al. Victora et al.). In addition, women tend to be more concerned with feeding of the youngest child in the household and it was considered necessary for this study to concentrate the analysis on the youngest child in the household. Further, data relevant for this study was collected for the youngest child only in the ZDHS. Therefore, all other children in the household were excluded even if they were within the 6 to 23 months age category.

The study also focused on married women because empowerment in the context of child feeding refers to the 'autonomy' that a woman would have in the household while residing with their intimate partners who may have more power to make decisions. As such, the study targeted married women who resided with partners in the same household because a woman's autonomy in such a household would indicate some level of empowerment (Kabeer, 1999 Hashemi & Schuler. 1993).

3.1.1. Sample description

A total of 3136 married women and children met the criterion described above and were included in the analysis of the study. The mean age of the women was 28.3 years (SD=6.7) with the youngest aged 15 and oldest being 48 years old while that of their husband or partners was 34.3 years (SD=8.2) and the youngest was 18 years and the oldest was 95 years old. In the sample, women were younger than their partners or husbands.

The mean age of the household heads was 35.9 year (SD=10.0) with the youngest being 18 years old and the oldest 93 years old and, almost all the households (90.3%) were male headed in the sample.

More than two thirds of the households (67.4%; 95% CI [65.6-69.2]) in the sample lived in rural areas compared to 32.6% (95% CI [30.8-34.4]) who lived in urban areas. Further, 25.0% (95% CI [23.2-26.8]) of households were poorest and 14.3% (95% CI [12.5-16.1]) were richest in the sample. The average household size was 6.4 usual members (SD=2.7) with the smallest household having 2 members and the largest with 23 usual members (Appendix 1, Table 1a1).

The sample comprised of 51.1% (95%CI [48.3-51.9]) male and 49.9% (95% CI [48.1-51.7]) female children. The average age of the children in the sample was 14.5 months (SD=5.1) with the youngest being 6 months old and the eldest was 23 months old (Appendix 1a, Table 1a1). This shows that the sample had more male children than female children.

The median birth weight of the child was 3.2kg (SD=.6) with the heaviest weighing 6.3kg and the lowest birth weight being .8gms, most mothers perceived their children's birth weight as average (57.3%, n=1792). Almost all children were still breast feeding (80.7%).

Most of the women in the sample had attained up to primary level education (57.3%; 95% CI [55.5-59.0]) and their partner's highest level of education attained was either primary or secondary level (42.4%; 95% CI [40.6-44.2]) (Appendix 1a, Table 1a2). Among the 3127 women in the sample, 46.6% (95%CI [40.5-45.1]) of the women were not working and 53.4% (95% CI [50.1-53.7]) were working at the time of the assessment. Of those that were working (n=1667), majority were doing agricultural related jobs (35.0%; 95% CI [32.7-37.2]) and only very few (3.8%; 95% CI [1.5-6.1]) did professional related jobs. Most of the women were self-employed (74.5%; 95% CI [72.2-76.8]) and also worked away from home (76.3%; 95% CI [74.0-78.6]). Almost the same proportion of women were paid in form of cash (48.9%, n=876) and those that were not paid (48.9%; 95% CI [41.2-45.8]). Of those that were paid, 71.15 (95% CI [68.0-74.2]) earned less than their partners. The media exposure among women was very low in the sample, majority of the women never watched TV (65.9%; 95% CI [64.2-67.6] or listened to the radio (41.1%; 95% CI [39.4-42.8] (Appendix 1a, Table1a3).

The women involved in the study were generally married young mothers mostly living in rural areas. Majority lived in poor households with large family size. However, most women were engaged in some form of self-employment which were mainly agricultural related works. The study included more male children most of whom were young hence majority were still breast feeding.

3.2. Measures

The independent measures in this study were women empowerment dimensions that were developed from the data and the selected covariates. The covariates included household, woman's and children's characteristics.

The study had two dependent variables, one for each of the two objectives of the study. Child diet diversity was a dependent variable for the analysis of the associations between women empowerment dimensions and child diet diversity while each food groups were dependent measures for the analysis of the

association of the women's empowerment dimensions and feeding of children on foods from each of the food groups.

3.2.1. Independent measures

Women empowerment.

Measurement of women's empowerment has been found to be challenging. Literature shows that empowerment is an elusive indicator which is context-specific measuring behaviors and attributes that depends on the context in which the assessment is done (Malapit & Quinsumbing 2015; Hashemi & Schuler, 1993; Malhotra et al, 2002).

As alluded to by Kabeer (1999), women's empowerment is mainly influenced by the norms and rules which cannot be measured by a single indicator. This makes it particularly difficult to measure empowerment and make comparative analysis in quantitative research. Malhotra & Schuler, 2005: 20 argued that empowerment as an indicator is more 'behavioral, normative and continually developing'. Therefore a large number of items are required to measure it. However, researchers have utilized the six factors that Hashemi & Schuler, (1993) proposed to develop standard items that describe women's empowerment. These have been adopted in many research and were also used in the ZDHS.

Researchers have opted for different methodologies of using the standard proxy indicators to measure women's empowerment research. Some researchers use individual items that define women's empowerment to measure the association with the variable of interest (Cliffer et al.2010; Bhagowalia et al. 2010). Others align the individual items into the possible dimensions from the six factors (Hashemi & Schuler, 1993) and recode the responses of each item to create a dichotomous women's empowerment variable which indicate that a woman is empowered or not (Na et al.). These techniques are likely to overestimate relationships because different concepts of empowerments could be correlated and may replicate the effect of empowerment on the test indicator (Fields, 2013). In addition, this techniques often results in loss of information and may lead to

reduction in efficiency in the statistical analysis under consideration (Agresti, 1984).

However, a few studies have used Principle Component Analysis (PCA) technique to isolate the inherent factors in the data which are then used to measure the associations (Kawaguchi, Faudi, Chian, 2014; Tadesse, Tecklie, Yazew & Gebreselassie, 2013; Sen & Begum, 2015; Williams, 2005). This technique has a number of advantages in handling data with a large set of items.
Firstly, PCA groups the items and allows variables that measure the same concepts to correlate into clusters. Secondly, it transforms the original question items into the new set of linear combinations and uses all the variance from the variables in the dataset hence accounts for all the variance. Thirdly, it converts the related concepts into a continuous variables thereby allowing the use of advanced techniques to model association with development indicators (Fields, 2013). .

Therefore, this study adopted the use of the PCA in identifying the dimensions that were present in ZDHS data collected on women's empowerment. PCA was considered suitable for the creation of women's empowerment dimensions because firstly, Women's empowerment is mainly influenced by the norms and rules within the context in which the data is collected and it cannot be measured by a single indicator. Therefore a large number of items are used to measure it. Hashemi and Schuler (1993) in their six factors explained that the six factors influence each other in creating the empowerment state. Therefore, it was expected that the items included in the data set will correlate and the use of other methods would overestimate the association between women's empowerment and child diet diversity.

Therefore, this study used PCA to develop the women's empowerment dimensions from the ZDHS data set, this technique assisted in answering the study objectives of establishing the 'associations' which required the use of advanced statistical analysis. The use of PCA allowed to have scale variables that

were used in the multiple regression analysis to establish the associations. Further, there is no study that has used this techniques to develop women's empowerment dimensions for the analysis of the associations with child diet diversity.

The following variables in the dataset were used to create the women's empowerment dimensions using PCA;

Women empowerment questions available in the ZDHS

1. Who usually decides how the money that you earn will be used in the households. Four responses were provided; 1 was indicated if the respondent made the decisions, 2 if her husband/partner made the decision, 3 if the decisions was made by both the respondent and husband/partner jointly and 6 was indicated if others made the decision.
2. Who usually decides how your husband's/partner's earnings? Five response categories were provided: 1. if it was the respondent, 2 if it was her husband/partner , 3 if it was made jointly respondent and husband/partner jointly and 4 if husband/partner had no earning, 6 was indicated if others made the decision.
3. Who usually makes decisions about health care for yourself? Five options were provided; 1. if it was the respondent, 2 if it was her husband/partner , 3 if it was made jointly respondent and husband/partner jointly and 4 if someone else made the decision, 6 was indicated if others made the decision.
4. Who usually makes decisions about making major? Five options were provided; 1. if it was the respondent, 2 if it was her husband/partner , 3 if it was made jointly respondent and husband/partner jointly and 4 if someone else made the decision, 6 was indicated if others made the decision.
5. Who usually makes decisions about making purchases for daily household needs? Five options were provided; 1. if it was the respondent, 2 if it was her husband/partner , 3 if it was made jointly respondent and

husband/partner jointly and 4 if someone else made the decision, 6 was indicated if others made the decision

6. Who usually makes decisions about visits to your family? Five options were provided; 1. If it was the respondent, 2 if it was her husband/partner, 3 if it was made jointly respondent and husband /partner jointly and 4 if someone else made the decision, 6 was indicated if others made the decision.
7. Do you own this or any other household either alone or jointly? Four options were provided; 1 was indicated if she own it alone only, 2. If they own it jointly, 3 if both own alone and jointly, 4. If they do not own any.
8. Do you own any land either alone or jointly with someone else? Four options were provided 1 was indicated if she own it alone only, 2. If they own it jointly, 3 if both own alone and jointly, 4. If they do not own any.
9. In your opinion, is a husband justified in hitting or beating his wife if she goes out without telling him? Three responses were provided 1 if she agreed to the opinion, 2 if she did not and 3 if she did not know ,
10. In your opinion, is a husband justified in hitting or beating his wife, if she neglects the children? Three responses were provided 1 if she agreed to the opinion, 2 if she did not and 3 if she did not know
11. In your opinion, is a husband justified in hitting or beating his wife, if she argues with him? Three responses were provided 1 if she agreed to the opinion, 2 if she did not and 3 if she did not know
12. In your opinion, is a husband justified in hitting or beating his wife, if she refused to have sex with him? Three responses were provided 1 if she agreed to the opinion, 2 if she did not and 3 if she did not know
13. In your opinion, is a husband justified in hitting or beating his wife, if she burnt the food? Three responses were provided 1 if she agreed to the opinion, 2 if she did not and 3 if she did not know

The 13 items described above on women's empowerment were exposed to the PCA. Prior to the analysis, data screening was done using the Kaiser-Meyer-Olkin (KMO) and Bartlett's test for Sphericity (Bartlett's, 1954). The screening indicated

that the items were suitable for PCA with the KMO of 0.860 and a significant Bartlett's test (P<0.001). The test also checked the suitability of the individual items for analysis using Anti image correlations and all the items had a coefficient above 0.7 which was above the threshold of less than 0.5. Therefore, no items were removed from the analysis.

In the second part of the analysis, PCA extracted three factors using the weighted least of squares (Table 3.1), the extraction limit was set for eigenvalues greater than 1 to determine the linear combinations within items. Both Varimax and Oblimin rotations were performed and the results of the rotation were similar. Therefore, the Varimax rotation was preferred because the women's empowerment components were expected to be correlated and this technique made the reading of the results easier.

In addition, the scree plot was also selected to graphically present the factors on the plot. The plot also confirmed the presence of three factors before the break of the elbow. The extracted factors explained the combined variance of 22.4%, 14.1% and 11.1%. The loading for each variable are presented in the Table 3.1. The factors were then saved as variables in the data set and were named as support for violence against women dimension, decision making women's empowerment dimension and asset ownership women's empowerment dimension.

As can be seen in Table 3.1, the first component (support for violence against women) loaded heavily on items suggesting women's opinion of wife beating, the second (Decision making) loaded heavily on decision making and the third (Asset ownership) loaded on ownership of Land and house.

Table3.1: Rotated women empowerment dimensions.

	Dimensions		
	Support for violence against women	**Decision making**	**Asset ownership**
Beating justified if wife neglects the children	.769		
Beating justified if wife goes out without telling husband	.750		
Beating justified if wife argues with husband	.696		
Beating justified if wife burns the food	.660		
Beating justified if wife refuses to have sex with husband	.585		
Person who usually decides on large household purchases		.726	
Person who usually decides what to do with money husband earns		.669	
Person who usually decides on respondent's health care		.626	
Person who usually decides on visits to family or relatives		.624	
Person who usually decides how to spend respondent's earnings		.474	
Person who usually decides on household purchases for daily needs		.444	
Owns a house alone or jointly			.871
Owns land alone or jointly			.868
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			

The three women's empowerment dimensions were used as independent variables in examining their relationships with household demographic, and women's characteristics for women and child diet diversity (Appendix 1b).

3.2.2. Dependant measures

(i) Specific food groups measures

The independent measures for food groups were developed from the list of foods that children were fed on 24 hours prior to the interview. Each of the foods on the pre-set standard list were dichotomously coded in the ZDHS. Responses on each food were coded as '0' if the food was not consumed and '1' if the food was consumed. Since the study targeted children 6 to 23 months old, all the questions on the foods consumed were groups under each specific food groups following the FAO & FHI 360 (2016) and FAO (2-11b) guidelines as presented in Table 3.2.2. New dichotomous variables for each food groups were computed with a '1' coded if any food in the group was consumed and a '0' if no food was fed to the child in that group. Therefore, seven dichotomously coded variables were created. These were used as independent measures in investigating the associations between feeding children on foods from specific food groups and women's empowerment measures.

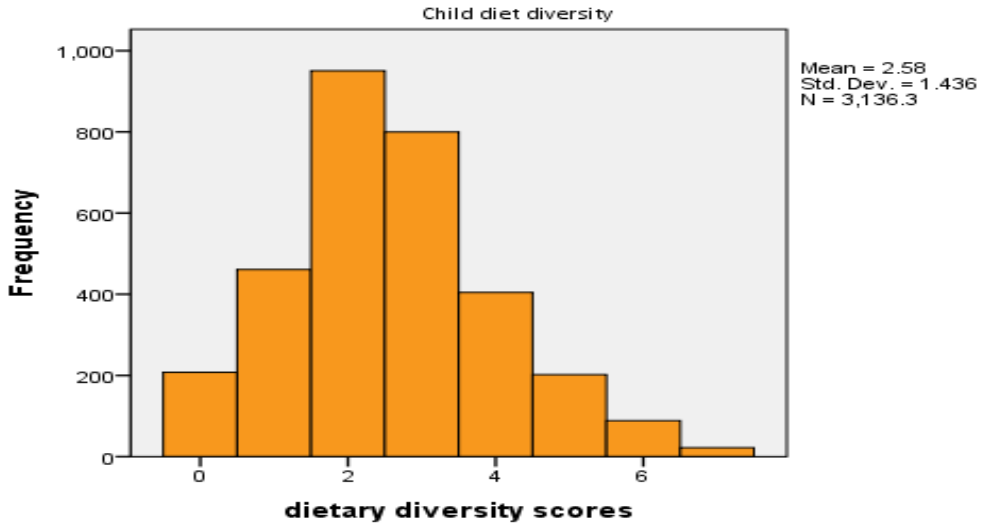
(ii) Child diet diversity measure

Diet diversity is a nutritional indicator which is used to define the consumption of different foods from the recommended food groups. Child dietary diversity was calculated by summing up all the dichotomous variables of the seven specific food groups discussed above into a mean score (FANTA, 2006; FAO & FHI 360, 2016). The diet diversity score presented in Figure 3.1 was 2.5 (SD=1.4)

Table 3.2.2: Food groups in the infant and young child feeding diet diversity assessment.

Food groups	Variables in the dataset
Starchy foods	1. Gave child potatoes, cassava, or other tubers 2. Gave child bread, noodles or other foods made from grains
Legumes , Pulses , beans and nuts	3. Gave child food made from beans, peas, lentils, nuts
Dairy foods	4. Gave child baby formula (b) gave child tinned, powdered or fresh milk 5. Gave child cheese, yogurt, other milk products 6. Gave child yoghurt
Flesh foods	7. Gave child meat (beef, pork, lamb, chicken, etc. 8. Gave child liver, heart, other organs (c) gave child fish or shellfish) 9. Gave child caterpillars, other insects or small protein foods
Eggs	10. Gave child eggs
Vitamin A rich foods and Vegetables	11. Gave child pumpkin, carrots, squash (yellow or orange inside) 12. Gave child any dark green leafy vegetables 13. Gave child mangoes, papayas, other vitamin A fruits.
Other fruits and vegetables	14. Gave child any other fruits

Figure 3.1: child diet diversity



3.2.3. Control measures

Literature shows that child diet diversity is generally influenced by a number of factors which might be household related, individual, biological and social economic. Therefore, in order to establish the relationship between diet diversity and any other test variables, it is important to control for the known factors that might influence the observed relationship. This procedure clearly shows the existence of the relationship between the variables of interest while holding all other influencers constant during the analysis. Literature (reviewed in chapter two) has established the association of the covariates with child diet diversity. The following were the covariates identified in the ZDHS dataset;

(1) Household Characteristics

(i) Residence

The type of residence of the women was entered on the women questionnaire from the sampling frame. Rural regions were coded '1' and urban were coded '2'.

(ii) Wealth Index

The wealth index was categorized into 5 groups namely; 1, poorest, 2. Poor, 3. Middle, 4. Richer and 5. Richest. During the analysis, this variable was recoded into 3 categories ie '1' for poor, '2' for medium and '3' for rich.

(2) Women's characteristics

(i) Ages of the woman:

In the ZDHS, the women were asked to state their age, in completed years from their last birth days and actual numbers were recorded in the data set.

(ii) Women level of education.

Four responses were coded for the woman's level of education; '0' for no education, '1' for primary education attainment, '2' for secondary education attainment and '3' for higher education.

(iii) Women's working status

In the dataset, this variables was dichotomously coded with '1' meaning she was working and '2' to mean she was not working.

(iv) Woman's media Exposure

Information on the women's frequency of exposure to media was collected using three questions. Women were asked how often they read the newspaper or magazine, listened to radio and watched television in a week. Four responses were provided which were '0' if the woman was not exposed to any of the three mediams, '1' if they read any magazines or newspaper, listened to the radio or watched TV less than once a week, '2' if they did it at least once a week and '3' if they did it almost every day. A mean scale variable was created from these three variables to represent the media exposure and was used in the analysis.

(3) Child characteristics

The women were asked about their children's characteristics such as the age of the child in completed months, number of children less than five years old in the households. Numerical values were recorded for each of these questions in the dataset. The mother's perception of the size of the child at birth was captured by asking the mothers how big they thought their children were at birth and responses were categorized as '1' very large, '2' larger than average, '3' average, '4' smaller than average, '5' very small, '6' don't know. This variable was recoded into three categories for the purpose of the analysis i.e. '1' for big, '2' for medium and '3' for small. The Sex of the child in the data set was coded '1' for male and '2' for females in the dataset.

3.3. Data analysis

Data analysis for this study was done using SPSS version 23. Bivariate analysis were performed to establish the associations between child diet diversity and the independent measures while multivariate regression analysis was used to establish the predictions of child diet diversity among the independent variables.

Bivariate analysis

Bivariate analysis were performed between each of the women empowerment dimensions and the covariates (Appendix 3.1b). Also bivariate analysis were also performed between child diet diversity and covariates (Appendix 3.1c; Appendix 3.1c1). The results in these analysis helped to identify the relationships between each of the potential confounders and child diet diversity and also women empowerment. It also assisted in identifying variables that needed to be controlled for during the regression analysis. Covariates that had significant associations with child diet diversity were controlled for during the regression analysis. This analysis had no direct relevance to answering the research questions of the current study. Therefore, the results were placed in Appendices.

Further, bivariate analysis were also performed between women's empowerment dimensions and child diet diversity. This analysis assisted in establishing the individual relationship of the women empowerment dimensions with child diet diversity without controlling for any confounders.

Multivariate analysis

Multivariate analysis between women's empowerment dimensions and child diet diversity and also between women empowerment dimensions and each of the specific foods groups were performed.

Multivariate regression analysis was used to assess the effects of multiple independent measures including women empowerment dimensions and control variables on child dietary diversity as a dependant variable. This analysis was important to identify the predictors of child diet diversity and the relative importance of each variables in the relationship while the effect of all other independent variables including the confounders were held constant.

Two models were sequentially built to assess the associations between child diet diversity and the independent variables using stepwise technique. The stepwise entry technique was preferred to allow the researcher observe the effect of the different groups of variables as they were being added to the model and measure

their effect on the overall power of the model (Field. 2013). In the first model, significant demographic and individual characteristics for mother (outlined above), and child characteristics were fitted on to the model. Finally empowerment measures (dimensions) were included in the model to assess the relative importance of each empowerment dimensions in explaining child diet diversity while controlling for the other independent variables. In the final analysis when all the variables were fitted on to the model, the association of women empowerment dimensions and child diet diversity was established.

3.4. Ethical considerations

The study used anonymized secondary data for the ZDHS which was accessed through the USAID data Achieve as a micro data. All sensitive information were excluded from the data set. Though the study involves children less than 5 years, the researcher had no direct contact with the study subjects. In addition, the ZDHS underwent vigorous ethical screening by the University of Zambia Ethics committee (UNZAREC). For the current analysis, an ethics application was made to the Trinity Colleges University Ethics committee and approval was given to utilize secondary data for this study. Given the procedures outlined, the researcher will ensure that the data accessed for the research is only used for the purpose it was requested for and that data protection guidelines are taken into consideration throughout the period of data analysis. Data will be destroyed upon the final marking of thesis.

CHAPTER 4. RESULTS

Introduction

The aim of this study was to examine the associations between women's empowerment dimensions and child dietary diversity for children 6 to 23 months in Zambia. Specifically, the study looked at:

1. The relationship between women's empowerment dimensions and child dietary diversity.
2. The association between women's empowerment dimensions and feeding of children on food from specific groups.

This chapter presents the results of the study in two parts. The first part presents the bivariate and multiple regression analysis of the association between women's empowerment dimensions and child diet diversity and the second part discusses the regression analysis of the relationship between the women's empowerment dimensions and feeding children on each of seven different foods groups.

4.1. Is there any association between the women's empowerment dimensions and child diet diversity?

The relationship between women's empowerment dimensions (support for violence against women, decision making empowerment dimension and asset ownership empowerment dimension) and child diet diversity was assessed using the Pearson's product moment correlations. This analysis was important in establishing the existence of the relationship between each empowerment dimension and child diet diversity.

4.1.1. Bivariate analysis between women's empowerment dimensions and child diet diversity

(1) Support for violence against women' empowerment dimension

The results of the relationship between support for violence against women dimension of women's empowerment and child diet diversity showed the existence of a statistically significant negative relationship [r=-0.119, N=953, P<0.001] (Appendix 4.1a). The strength of this association was medium (eta

squared =0.014) as it explained 1.4% of variance in child diet diversity. The results suggest that child dietary diversity reduced with increasing support for violence against women.

(2) Asset ownership women's empowerment dimension

The investigation between asset ownership empowerment dimension and child diet diversity indicated statistically significant negative association [r=-0.065, N=953, P=0.046] (Appendix 4.1a). However the effect size of this association was small (eta squared = 0.004) (Cohen. 1988) explaining only 0.4% of the variance in child dietary diversity. The results imply that child diet diversity reduced slightly with increasing women's asset ownership empowerment.

(3) Decision making women's empowerment dimension

Decision making women's empowerment dimension was found to have a relationship with child diet diversity. A statistically significantly negative association was found between decision making and child diet diversity [r=-0.087, N=953, P<0.001] (Appendix 4.1a). The strength of this association was found to be very small (eta squared= 0.008) (Cohens.1988). The results show that child diet diversity decreased slightly with increasing women's decision making empowerment.

In summary, the bivariate analysis of the three women's empowerment dimensions show negative associations between child diet diversity and all the three women's empowerment dimensions as presented in Table 4.1a. The results indicate that the correlation of determination for support for violence against women was r^2 =0.014, for decision making was r^2 =0.0076 and for asset ownership was r^2 =0.0042. These results suggest that child diet diversity reduces with increasing support for violence against women's empowerment, decision making for women and asset ownership empowerment. However, all the empowerment dimensions explained very little variance; support for violence = 1.4%; decision making =0.7% and asset empowerment =0.04% (Cohen, 1988).

Table 4.1a: Women's empowerment dimensions and child dietary diversity score

Women's empowerment dimension	Correlation with diet diversity
Support for violence against women	-.119**
Decisions making	-.087**
Asset ownership	-.065*

**P<0.001; *P<0.05; n=953

4.1.2. Regression analysis for the association between women's empowerment dimensions and child diet diversity.

Following the bivariate analysis of the association between women's empowerment and child diet diversity discussed above, regression models were used to further assess the associations between the women's empowerment dimensions and child diet diversity while controlling for the covariates. A hierarchical regression technique was to build two models in examining this relationship. The first model was fitted with known covariates (type of residence, number of children in the household, women's education status, woman' sage, women's working status, breast feeding status, woman's exposure to media, child's age, child's size at birth, age of the child, sex of the child), while the women's empowerment dimensions (support for violence against women, decision making and asset ownership) were included in the second model. This analysis helped observe the relationships between each of the women's empowerment dimensions and child diet diversity without the influence of other independent variables.

The result of the relationship between women's empowerment dimensions (Support for violence against women, decision making and asset ownership) and child diet diversity are presented in Table 4.1b. The Table shows that when covariates only were included, this model was significant and explained 15.2 % variance in child dietary diversity [F (11,925) = 16.301, P<.001]. In this model, woman's exposure to media was the most significant predictor of child diet diversity (P<0.001, β =0.152) followed by child' age (P<0.001, β =0.138), the child's size at birth (P<0.001, β= -0.107), the woman's level of education

(P=0.009, β =0.102), breast feeding status (P=0.026, β= -0.082) the woman's working status (P=0.008, β =0.081) and the woman's age (P=0.025. β =0.069). The introduction of the three women's empowerment dimensions did not make any improvement to the model,- this final model still explained the same variance (15.2%) [F (14,957) =12.957, p< 0.001]. None of the three women's empowerment dimensions were significant predictors of child diet diversity: support for violence against women dimension (P=0.668), decision making dimension (P=0.850 and asset ownership dimension (P=0.157). The tolerance values for this analysis was between 0.45-0.99 and the diagnostic plots showed no violation of the regression analysis (Appendix 4.1b).

Table 4.1b: Associations between child diet diversity and women's empowerment dimensions.

	Model 1		**Model 2**	
	B	***Beta***	***B***	***Beta***
(Constant)	***1.634***		***1.760***	
Type of place of residence	-.091	-.030	-.139	-.046
Education in single years	.038*	.102	.038	.102
Number of children 5 and under in household	-.058	-.032	-.064	-.036
Breastfeeding status	-.287*	-.082	-.289	-.082
Woman working status	.477*	.081	.466	.080
Sex of child	-.012	-.004	-.013	-.004
Child's age in months	.040**	.138	.040	.136
Media exposure	.259**	.152	.255	.150
Wealth status of the household	.053	.032	.066	.040
Women's age in years	.016**	.069	.014	.063
Size of the child at birth	-.255**	-.107	-.254	-.107
Support for violence against women			-.020	-.014
Decision making domain			.009	.006
Asset ownership domain			.073	.050

Summary

	R	R^2	Adjusted R^2	P value
Model 1	0.403	.16255	.152	0.001
Model 2	0.405	.164	.152	0.0001

**P<0.001; *P<0.05

The analysis showed that all the three women's empowerment dimensions were not predictors of child diet diversity. However, a positive association was

established between child diet diversity and women's exposure to media, age of the children, educational attainment of the women and working status of the women. Women who were frequently exposed to media fed their children on diverse diet, older children were fed on diverse diet. On the other hand, mothers who were breast feeding and those who perceived their children to be bigger at birth fed their children on less diverse diets.

4.2. Is there a relationship between women's empowerment dimensions and feeding children on foods from specific food groups?

The relationship between women's empowerment dimensions and feeding of children on foods from the seven specific food groups (starchy foods, dairy foods, flesh foods, legumes and nuts, other fruits and vegetables and eggs) was analysed using multivariate regression models. In order to save space, this section only present the regression analysis and more detailed statistics on the consumption of food groups are presented in appendix 1a. Hierarchical regression technique was developed to assess the association of the three empowerment dimensions with each of the seven food groups in order to predict feeding of children on foods from the specific food groups on the women's empowerment dimensions while holding constant the covariates.

4.2.1. Feeding children on starchy foods

The results of the analysis of the association between women's empowerment dimensions and feeding children on starchy foods are presented in Table 4.2.1. The Table shows that the first model which was fitted with covariates only explained a very small variance of 2.1% in feeding children on starchy foods [$F(11.920) = 2.847$, $P<0.001$]. In this model, the wealth of the household was the most significant predictor of child diet diversity ($P=0.015$, $\beta = -0.125$) followed by the breast feeding status of women ($P=0.007$, $\beta = -0.107$), then finally media exposure of women ($P=0.033$, $\beta = 0.099$). A slight improvement to this model was observed after Introducing the three women's empowerment dimensions, the model explained 2.7% variance in feeding children on starchy foods [F

(14,917) =2.856, P<0.001]. This second model, showed that support for violence against women's empowerment dimension had a statistically significant negative association with feeding children on starchy products (P=0.010, β =-0.089). Decision making (P=0.844) and asset ownership empowerment dimensions (P=0.738) were not significantly associated with feeding children on starchy foods. The tolerance values for this analysis ranged between 0.5-0.9.

Table 4.2.1: Feeding children on starchy foods and women's empowerment dimensions.

	Model 1		Model 2	
	B	***Beta***	***B***	***Beta***
(Constant)	1.008		1.005	
Type of place of residence	-.035	-.060	-.024	-.041
Education in single years	.003	.042	.002	.026
Number of children 5 and under in household	-.018	-.051	-.016	-.046
Breastfeeding status	-.073*	-.107	-.072*	-.106
Woman working status	.048	.041	.050	.044
Sex of child	.000	.001	.000	.001
Child's age in months	.000	-.005	.000	-.004
Media exposure	.033*	.099	.032*	.097
Wealth status of the household	-.040*	-.125	-.044*	-.137
Women's age in years	.001	.023	.001	.014
Size of the child at birth	.001	.003	.004	.008
Support for violence against women			-.026*	-.089
Decision making domain			-.011	-.039
Asset ownership domain			.000	.002

Summary

	R	***R²***	***Adjusted R²***	***P value***
Model A	.181	.033	.021	0.001
Model B	.204	.042	.027	0.0001

**P<0.001; *P<0.05

The results suggest that support for violence against women was negatively associated with feeding children on starchy foods, meaning that women who did not support violence against women were less likely to feed their children on starchy foods. Feeding children on starchy foods did not differ among women who were empowered with asset ownership and decision making.

4.2.2. Feeding children on dairy foods

The association between feeding children on dairy products and the three women's empowerment dimensions was examined using hierarchical regression models while controlling for all the confounding factors. In the first model as presented in the Table 4.2.2, when all the covariates were fitted, the model explained 22.0% of variance in feeding children on dairy products and the model was significant [F (11.915) =24.758, P<0.001]. In this model, the woman's years in education was the most important predictor of child diet diversity (P<0.001, β =0.240), followed by the breast feeding status of the woman (P<0.001, β= -0.178), then woman's exposure to media (P <0.001, β =-0.153), the child age (P=0.026, β =0.071) and finally the woman's age (P=0.023, β =0.066). Introducing the three women's empowerment dimensions slightly improved the final model variance to 23.5% in feeding dairy products to the children [F (14,912) =20.052, P<0.001]. In this model, decision making women's empowerment dimension was significantly positively associated with feeding children on dairy products (P=0.015, β =0.077). Support for violence against women's dimensions and asset women's empowerment dimensions were not significantly associated with feeding children on dairy foods (P=0.565, P=0.304 respectively).The tolerance value for this analysis ranged between 0.45-0.99.

Table: 4.2.2. Feeding children on dairy foods and women's empowerment dimensions

	Model 1		Model 2	
	B	***Beta***	***B***	***Beta***
(Constant) dairy	.207		.245	
Type of place of residence	-.076	-.109	-.096	-.136
Education in single years	.021**	.240	.022**	.253
Number of children 5 and under in household	-.007	-.018	-.009	-.022
Breastfeeding status	-.146**	-.178	-.147**	-.178
Woman working status	.013	.010	.006	.004
Sex of child	-.016	-.023	-.017	-.024
Child's age in months	-.005*	-.071	-.005*	-.076
Media exposure	.061**	.153	.060**	.150
Wealth status of the household	-.009	-.022	-.007	-.018
Women's age in years	.004*	.066	.004*	.069
Size of the child at birth	-.014	-.024	-.015	-.026
Support for violence against women			-.006	-.018
Decision making domain			.027*	.077
Asset ownership domain			.012	.035

Summary

	R	***R²***	***Adjusted R²***	***P value***
Model A	0.479	.229	.220	0.001
Model B	0.485	.235	.224	0.0001

**P<0.001; *P<0.05

The results suggest that women who were empowered to make decisions were more likely to feed their children on dairy products while no differences were observed in feeding dairy products based on support for violence and asset ownership empowerment dimensions.

4.2.3. Feeding children on flesh foods

The results of the relationship between feeding children on flesh foods and the three women's empowerment dimensions are presented in Table 4.2.3. The results shows that the first model with only the covariates was significant and explained 7.2% variance in feeding children on flesh foods [F (24,265) =2.464, P<0.001]. This model showed that the woman's exposure to media was a

significant predictor of feeding children on foods (P<0.001, β= 0.162) followed by the size of the child at birth (P <0.001, β =-0.105). Introducing the three women's empowerment dimensions made no change to the explained variance and none of the empowerment dimensions were significantly associated with feeding children on flesh foods (support against women (P=0.781), decision making empowerment (P=0.364) and asset ownership empowerment (P=0.139). The tolerance levels for this analysis ranged between 0.45- 0.99.

Table 4.2.3: Feeding children on flesh foods and women's empowerment dimensions

	Model 1		Model 2	
	B	Beta	B	Beta
(Constant)	.204		.234	
Type of place of residence	.047	.046	.037	.036
Education in single years	.003	.026	.003	.022
Number of children 5 and under in household	-.017	-.028	-.020	-.032
Breastfeeding status	.002	.001	.000	.000
Woman working status	.002	.001	.002	.001
Sex of child	-.011	-.011	-.010	-.010
Child's age in months	.007	.074	.007	.074
Media exposure	.093**	.162	.092**	.160
Wealth status of the household	.060*	.108	.068*	.122
Women's age in years	.002	.020	.001	.011
Size of the child at birth	-.084**	-.105	-.083**	-.103
Support for violence against women			.005	.009
Decision making domain			-.016	-.031
Asset ownership domain			.027	.054

**P<0.001; *P<0.05

Summary

	R	*R²*	*Adjusted R²*	*P value*
Model 1	.289	.083	.072	0.001
Model 2	.294	.086	.072	0.0001

The results suggest that none of the women's empowerment dimensions were related to feeding children on flesh foods.

4.2.4. Feeding children on Vitamin A rich foods

The results of the regression predicting feeding children on vitamin A rich foods as presented in Table 4.2.4 indicates that when only the covariates were fitted, the model was significant and explained 8.6% of feeding children on vitamin A rich foods [F (11,920) =7.879, P<0.001]. In this model, age of the child was a significant predictor of feeding children on foods (P<0.001, β= 0.249) followed by size of the child at birth (P=0.025, β =-0.-072). The introduction of the three women's empowerment dimensions made a very small change to the explained variance, the model only explained 8.7% variance in feeding vitamin A rich foods to the children [F (14, 917) =6.251, P<0.001]. However, none of the three women's empowerment dimensions were statistically significant; violence against women (P=0.590); decision making empowerment (P=0.776); asset ownership empowerment (P=0.285). This analysis had tolerance values ranging between 0.44-0.99.

Table 4.2.4: Feeding children on vitamin A rich foods and women's empowerment dimensions

	Model 1		Model 2	
	B	**Beta**	**B**	**Beta**
(Constant)	*.422*		*.397*	
Type of place of residence	.008	.008	.020	.020
Education in single years	-.009	-.074	-.009	-.079
Number of children 5 and under in household	-.008	-.014	-.007	-.012
Currently breastfeeding	-.043	-.037	-.042	-.037
Woman currently working	.062	.032	.067	.034
Sex of child	.008	.009	.009	.009
Child's age in months	.024**	.249	.024**	.251
Media exposure _ based on a score	.045	.081	.046	.082
Wealth status of the household	-.014	-.027	-.016	-.030
Women's age in years	-.001	-.016	-.001	-.016
size of the child at birth	-.056*	-.072	-.056*	-.072
Support for violence against women			.004	.007
Decision making domain			-.013	-.028
Asset ownership domain			-.010	-.022

**P<0.001; *P<0.05

Summary

		R	***R²***	***Adjusted R²***	***P value***
	Model 1	.293	.086	.075	0.001
	Model 2	.295	.087	.073	0.0001

The analysis suggests that none of the three women's empowerment dimensions had any influence on feeding vitamin A rich foods to children.

4.2.5. Feeding children on Legumes and nuts

The result of the regression predicting feeding children on legumes and nuts as presented in Table 5.2.5 indicate that when all the covariates were fitted, the model was significant and explained a very small variance of 1.8% in feeding children on legumes and nuts and the model was significant [F (11,913) =2.511, P<0.001]. Age of the woman was the only significant predictor of feeding children on legume and nuts (P<0.001, β= 0.204) in this model. Introducing the three women's empowerment dimensions reduced the explained variance of feeding children on legumes to 1.6% though the model still remained significant [F (14, 910) =2.079 P<0.001]. None of the three dimensions had a statistically significant relationship with feeding children on legumes and nuts; violence against women (P=0.9590), decision making empowerment (P=0.776) and asset ownership empowerment dimension (P=0.285). The tolerance values for this analysis ranged between 0.45-0.99.

Table 4.2.5. Feeding children on legumes and nuts and women's empowerment dimensions

	Model 1		Model 2	
	B	***Beta***	***B***	***Beta***
(Constant)	***-.026***		***.002***	
Type of place of residence	.026	.030	.011	.013
Education in single years	.005	.047	.006	.052
Number of children 5 and under in household	-.024	-.046	-.026	-.051
Breastfeeding status	-.033	-.032	-.034	-.033
Woman working status	.078	.046	.075	.044
Sex of child	-.031	-.036	-.031	-.036
Child's age in months	.004	.045	.004	.043
Media exposure	.028	.057	.027	.056
Wealth status of the household	-.018	-.038	-.013	-.026
Women's age in years	.007*	.108	.007*	.106
Size of child at birth	-.013	-.018	-.013	-.019
Support for violence against women			.008	.019
Decision making domain			.004	.010
Asset ownership domain			.017	.041

**P<0.001; *P<0.05.

Summary

	R	***R²***	***Adjusted R²***	***P value***
Model 1	.171	.029	.018	0.001
Model 2	.176	.031	.016	0.0001

The modelling of the association between women's empowerment dimensions and feeding children on legumes and nuts imply that women's empowerment status does not influence the feeding of children on legumes and nuts.

4.2.6. Feeding children on other fruits and vegetables

The results of the investigation of the association between feeding children on other fruits and vegetables and the three women's empowerment dimensions are presented in Table 4.2.6. The Table shows that when only the covariates were fitted, the first model was significant and explained 5.1% variance in feeding children on other fruits and vegetables [F (11.452) =4.452, P<0.001]. The mother's perceived size of the birth was the most significant predictor of feeding children on other fruits and vegetables (P=0.002, β= -0.099) followed by and age of the child (P=0.012, β=0.097). A slight improvement to the model was observed when the three women's empowerment dimensions were introduced,

the model explained 5.5% variance in the feeding on other fruits and vegetables [F (14, 912) =3.794, P<0.001]. However, none of the three women's empowerment dimensions were significantly associated with feeding children on other fruits and vegetables: support for violence against women (P=0.282); decision making empowerment (P=0.929); asset ownership empowerment (P=0.083). The tolerance values for this analysis ranged from 0.45-0.99.

Table 4.2.6. Feeding children on other fruits and vegetables and women's empowerment dimensions

	Model 1		**Model 2**	
	B	***Beta***	***B***	***Beta***
(Constant)	0.164		(Constant)	0.156
Type of place of residence	-0.05	-0.06	-0.069	-0.083
Education in single years	0.007	0.068	0.007	0.072
Number of children less than 5 years	-0.004	-0.009	-0.008	-0.016
Breastfeeding status	-0.036	-0.037	-0.038	-0.039
Woman working status	0.048	0.029	0.045	0.027
Sex of child	-0.015	-0.018	-0.014	-0.017
Child's age in months	.008*	0.097	.008*	0.095
Media exposure	0.01	0.022	0.01	0.02
Wealth status of the household	-0.001	-0.002	0.008	0.018
Women's age in years	0.003	0.048	0.003	0.042
Size of child at birth	-.065*	-0.099	-.066*	-0.1
Support for violence against women			0.015	0.037
Decision making domain			-0.001	-0.003
Asset ownership domain			0.027	0.065

Summary

	R	***R²***	***Adjusted R²***	
Model 1	0.225	0.051	0.039	*P<0.001*
Model 2	0.235	0.055	0.041	*P<0.001*

**P<0.001; *P<0.05

The analysis shows that none of the women's empowerment dimensions were associated with feeding children on other fruits and vegetables. This results suggest that feeding of children on fruits and vegetables did not vary with the type of women's empowerment dimension.

4.2.7. Feeding children on eggs

The results of the analysis of the association between feeding children on eggs and the three women's empowerment was examined and presented in Table 4.2.7. The Table indicates that when only the covariates were fitted, the model was significant and explained 5.9 % variance in feeding children on eggs [F 11,915) =6.257, P<0.001]. In this model the perceived size of the child at birth (P =0.023, β =-0.102) and age of the child (P=0.002 β =-0.094) were the main significant predictors of feeding children on eggs. Introducing the three women's empowerment dimensions reduced the variance explained to 5.6% though the model was still significant [F (14, 912) =4.940, P<0.001]. In this model, none of the three women empowerment dimensions had any statistically significant relationship with feeding children on eggs; violence against women (P=0.682, decision making empowerment (P=0.538) and asset ownership empowerment (P=0.893). The tolerance values for the regression analysis were between 0.45-099.

Table 4.2.7. Feeding children on eggs and women's empowerment dimensions

	Model 1		Model 2	
	B	**Beta**	**B**	**Beta**
(Constant)	***-0.03***		***-0.02***	
Type of place of residence	-0.03	-0.03	-0.03	-0.04
Education in single years	0	0.04	0	0.05
Number of children 5 and under in household	0.02	0.04	0.02	0.04
Breastfeeding status	0	0	0	0
Woman working status	0.1	0.06	0.1	0.06
Sex of child	0.02	0.03	0.02	0.03
Child's age in months	.01*	0.09	.01*	0.08
Media exposure	0.04	0.07	0.04	0.07
Wealth status of the household	0.05	0.1	0.05	0.1
Women's age in years	0	0	0	0
Size of the child at birth	-.07*	-0.1	-.07*	-0.1
Support for violence against women			-0.01	-0.01
Decision making domain			0.01	0.02
Asset ownership domain			0	0.01

Summary	***R***	***R²***	***Adjusted R***	***P value***
Model 1	0.265	0.7	0.059	P<0.001
Model 2	0.266	0.71	0.056	P<0.001

**P<0.001; *P<0.05

The results show that feeding children on eggs did not vary with any of the women's empowerment dimensions.

In conclusion, the results of the analysis have demonstrated that though negative associations were observed in the bivariate analysis between women's empowerment and child diet diversity, modelling the association while controlling for the effects of the covariates showed that none of the empowerment dimensions were associated with child diet diversity. This result suggest that the observed relationship in the bivariate could have been due to the influence of the confounding factors.

Similarly, the relationship between women's empowerment dimensions and feeding children on specific foods showed that two of the three women's empowerment dimensions were associated with feeding children on two different food groups. Feeding children on starchy foods had a negative association with support for violence against women and feeding children on dairy foods had a positive association with decision making empowerment dimension after controlling for the covariates. Asset empowerment dimensions of women's empowerment had no association with any of the food groups.

These results suggest that women who do not support violence against women are less likely to feed their children on starchy foods and women who are empowered to make decisions are likely to feed their children on dairy foods. Generally, the analysis shows that women's empowerment dimensions are weakly associated with child diet diversity.

CHAPTER 5. DISCUSSION

Introduction

Women's empowerment is currently being promoted as one of the nutrition sensitive interventions for addressing child stunting under the *`1000 most critical days program'* in Zambia. This assessed the association between the women's empowerment dimensions and child dietary diversity among children 6 to 23 months old in Zambia. It also examined the relationship between women's empowerment dimensions and feeding children on food from specific food groups. The paper used principle component analysis to identify the women's empowerment dimensions in the ZDHS data set. Three dimensions (namely support for violence against women, decision making and asset ownership) were identified and multiple regression was used to establish the associations between women's empowerment dimensions and child diet diversity and feeding children on specific food groups.

This chapter discusses the results of the study presented in the previous chapter in light of the existing literature. The chapter is presented in three sections: the first section; discusses the result of the associations between women's empowerment and child diet diversity, the second section discusses the associations between women's empowerment dimensions and feeding of children on foods from the seven food groups. The strengths and limitations of the study are discussed in the last section of the chapter.

5.1. Relationship between women's empowerment and child diet diversity

This study established that none of the three women's empowerment dimensions identified in this study (i.e. support for violence against women, decision making empowerment and asset ownership women's empowerment dimension) were significant predictors of child diet diversity. The finding means that women's empowerment dimensions make limited or no contribution to improving child diet diversity but women's exposure to media and breastfeeding status of children do.

This finding is not in line with studies by Na et al. and Beyene et al. which established an association between the different empowerment dimensions identified in their study. These differences could be attributed to different methodologies of developing women's empowerment measures in their studies and the current study.

One possible explanation for a lack of association between women's empowerment and child diet diversity could be that women's empowerment programs are more focused on improving women's access to resources and opportunities and has limited focus on child nutrition (Leroy et al.). This therefore means that advancements in women's empowerment may not directly results in improvement in child nutrition since empowered women may have limited understanding of child feeding practices. The scaling up nutrition initiative recommends that women's empowerment programs be made nutrition sensitive (NFNC, 2011).

Another possible explanation could be due to the low diet diversity among children in the study age group in Zambia. This study found a low mean child diet diversity among the children in the sample (2.6, SD=1.4). This means that most children consumed an average of food from two groups only. Similar observations were made by the CSO et al. which established that only 19% of the children in Zambia were fed on more than 4 groups of foods, and Mallard et al. (2015) who also reported that children in Zambia consumed food from an average of 2 groups (IOR: 2-3). Therefore the low diversity in the food groups consumed by the children could have limited the analysis of the association between diet diversity and women's empowerment in this study. Low child diet diversity has been associated with children's and mother's characteristics in this and many other studies.

This study found that the breast feeding status of the children was one of the most important predictors of child diet diversity. Children who were breastfed had a lower dietary diversity score (Mean=2.4, SD=1.4) than those that were not

breastfed (Mean 3.2, SD=1.4). This means that children who are breastfed are at risk of eating limited variety of foods and becoming undernourished. This finding is similar to the CSO et al. findings which also showed low dietary diversity (19%) among breastfed children than the non-breast fed children (34%). Studies have found that children who are heavily breast fed are fed less foods as the mother become reluctant to provide other foods because they believe that children will be satisfied when they are breastfed (Cincinnati Children's Medical Centre, 2014). This is an important finding in the case of Zambia where mothers are encouraged to breastfeed their children up to 24 months of age (CSO et al.; Mugode, Nthani, Bwalya & Amanzi, 2008). Heavy promotion of breast feeding without emphasis on feeding a variety of complementary feeds when the child is six months old is likely to be misunderstood by mother who do not understand the importance of good complementary feeding (WHO, 2010). Limited comprehension on the importance of giving a variety of foods to children after six months could result in low diet diversity (Senarath et al. 2011). This could be one of the contributing factors to the high levels of undernutrition among children 6 to 24 months old in Zambia. Children after six months of age should receive a variety of foods because breast milk has empirically been proven to be unable to supply the required nutrients to support growth and development after 6 months of the child's life (UNICEF-ESARO, 2014).

Another important finding in this study was that the child's age was an important predictor of child dietary diversity. The study found that older children were fed on more diversified diets than the younger children. This means that older children are more likely to receive a variety of nutrients than younger ones. This finding is in conformity with other studies that have found low diet diversity among younger children (Na et al; Kabir, et al; Beyene et al). Other studies attributed low diet diversity among the younger children to women's belief that feeding children on a variety of foods when they are young makes them develop cravings for expensive foods that the family cannot manage and sustain in future (Blaney, Februhartanty & Subakotjo, 2015). Literature also shows that younger children find it too hard to chew hard foods as they are still in the process of

developing the teeth and the taste for foods (UNICEF &WHO 2012). This could be one of the reasons why under-nutrition is higher between 6 to 18 months old and then levels off after (CSO et al, Butha, 2013). However, mothers are sensitized to use various methods of food preparation such as mashing of foods to make them easy for younger children to eat a variety of foods and receive the essential nutrients from different foods (United States Aids (USAID), 2011).

Another important predictor of child diet diversity found in this study was the media exposure of the women. The study found that child diet diversity increased with the increase in the women's exposure to media. This means that higher mothers' exposure to media is associated with high child diet diversity. The findings in this study concur with studies by and Beyene et al. which found that children whose mother listens to radio were three times likely to be fed on a diversified diet than those whose mothers were not exposed to any media. One possible explanation for this observation is that radio is one of largest communication channels with wide coverage used for the dissemination of child nutrition and health programs (Sanghvi et al. 2016). In Zambia, the National Food and Nutrition Commission (NFNC) has a studio that produces radio programs on child nutrition in different local languages on a regular basis, these are aired through the various community radio and television stations throughout the country. Further, the scaling up nutrition program also distributes radios to women's groups in rural communities and establishes women's radio listening groups where women listen to radio programs in groups and are encouraged to discuss how they can apply child feeding suggestions on the radio (NFNC, 2014). These strategies create awareness on child diet diversity.

Another explanation could be that women who were exposed to media could have been from the higher social status where the children's diet diversity was already high as observed in this study.

In general, the lack of association between women's empowerment dimensions observed in this study could be attributed to lack of strong link between women's

empowerment programs and child feeding since the programs are concentrated on gender equality and access to resources and opportunities. Other factors that might explain the lack of association could be the norms and traditions associated with feeding children on non-diverse diets which keeps the diet diversity consistently low.

5.2. Relationship between women's empowerment dimensions and feeding children on foods from the specific food groups

The discussion of the results of the association between women's empowerment dimensions and feeding children on specific foods in this section are presented in two parts. In the first part, the result of the specific foods (starchy foods and dairy products) that showed significant associations with specific women's empowerment dimensions (support for violence against women and decision making dimension) are discussed. The discussion of the results of all specific foods that showed no associations with the women's empowerment dimensions are presented in the second section. The discussion of the results in all the three sections are not compared because there were no equivalent studies

5.2.1. Support for violence against women's empowerment dimension and feeding on starchy foods

Our findings show that support for violence against women dimension of women's empowerment is negatively associated with feeding children on starchy foods (P=0.026). The result mean that mothers who did not approve of violence fed their children better than those that approved violence against women. One possible explanation of this result could be that women who support domestic violence most likely experience it in their households and they allow their partners to dominate every decision including child feeding decisions (Bhagowalia et al.). This situation may impair the women's decision-making ability to use or purchase different foods in the home to feed the child (Shroff Griffiths, Adair, Suchindran & Bentley, 2009). Literature shows that financial expenditure is the main sources of domestic violence in most household and if the woman support violence, they may avoid the violence by not getting involved in financial issues regarding

purchase and use of expensive foods for child feeding in the household (Sanders, 2015). As such they would resort to feeding starchy foods to children which are always available in the home and are less expensive (FAO, 2011a).

Further, if partners make most decisions on food in the home, they are likely to recommend limited variety. Research has shown that fathers have limited knowledge on the feeding of the children as they often do not have opportunities to be sensitized on child nutrition (Adeyemi et al. 2015). Therefore, fathers or partners who control feeding at home and lack knowledge on child feeding may be happy with feeding children on the available starchy foods in the household. Growing evidence shows that women and men allocate family resources differently with different health and nutrition outcomes. Empowering women with resources has been found to have a significant positive effect on child nutrition improvements than empowering men (Black et al).

Another possible explanation of our result could be that when the women support violence, there could be a likelihood that children in the household experience it (Sobkoviak et al. 2012). Studies have shown that children who are exposed to violence between partners develop stress which might increase their intake of energy foods such as starchy foods (Wilson, 2014), and this situation also increases the chance of children developing certain diseases that might affect consumption of foods from some food groups (Weisz et al. 2011). It might further prompt children to accept starchy foods and refuse to eat other types of foods offered to them. Consumption of starchy foods in large amounts with limited variety of other food types has been associated with high levels of malnutrition (UNICEF &WHO, 2012; Ziaei, Navad &Ekstron 2012).

5.2.2. Decision making women's empowerment dimensions and feeding children on dairy foods

Another key finding in this study was that decision making women's empowerment dimension was positively associated with feeding children on dairy products. These results mean that mothers who are empowered to make

decisions have a higher probability of feeding their children on dairy foods than those that are not. Black et al. and Malapit et al. claimed that women who are empowered to make decisions are likely to use the household resources for better child feeding. Mothers with younger children are sensitized on types of foods to feed the children after 6 months of age that empowers them with knowledge to base their decision for child feeding on (Bhutta et al). Studies have found that women who acquire knowledge on child feeding (a measure of empowerment) consider milk and milk products not as a complementary food but as an essential food for children (Semahegan, Tesfaye & Bogale, 2014). Vitta et al. 2016) found that mothers who are exposed to information on feeding of milk products especially during children's clinics are likely to feed their children on milk products. Feeding dairy products to children is promoted because they provide children with high quality protein to support tissue development and growth among children (Bertazzo et al. 2016; Iannotti, Muehlhoff, & Mcmahon, 2013).

Another explanation for this finding could be that empowered mothers are able to make decisions to use household resources to access the food they consider to be appropriate for children (Malapit et al. Wyatt et al. (2015) revealed that women in an agricultural settlement who reared cattle exercised their decision power to ensure that milk from the dairy animals in their homesteads was fed to children younger than 2 years old than adults when the supply was low. Patel, Patel, Patel, Patel, & Gelani, (2016) found that women play a major role in the collection, processing and sale of cow's milk as well as the care and feeding of animals in the dairy production. Therefore, they made decisions on the use of milk in feeding children. Dairy production is one of the agricultural women's empowerment strategies among the rural poor communities (Stewart et al).

A further explanation could be that there is a change in the feeding option for children in light of HIV transmission. The health staff in the clinics sensitize women on the risks of transmission and encourage them to make decisions on child feeding options they would adopt and sustain before the child is born (Flax et al. 2016). Mother who cannot breastfeed are encouraged to feed their children

on infant formulae in addition to other foods after 6 months of age (WHO & UNICEF, 2016; WHO, 2010). Adherence to this recommendation require empowered women to negotiate with other family members to opt for milk feeds for the children (van den bold et al; Malapit et al. Dairy products are usually expensive and can only be purchased for child feeding if the women are empowered to negotiate and convince other family members to accept and support their decision to opt for milk products (Kabeer, 1999).

5.2.3. The three women's empowerment dimensions and feeding children on flesh foods, Vitamin A rich foods, other fruits and vegetables, Legumes and Nuts, Eggs.

Our findings show that asset ownership women's empowerment dimension was not associated with feeding children on any of the seven food groups. Additionally, feeding children on vitamin A rich foods, other fruits and vegetables, legumes, eggs and flesh foods was not associated with any of the three women's empowerment dimensions. This means that the feeding of the children on foods from these food groups did not vary with these empowerment dimensions. The lack of association between the dimensions and feeding children on foods from specific food groups could be explained by the fact that the feeding pattern of children on these foods is generally similar in Zambia. Halimatou et al. (2014) and CSO et al. reported little variation in the consumption of these food groups among the children. Their studies showed that children are generally fed on plant based foods such as starchy foods, vegetables, and vitamin A rich foods and very few were fed on flesh foods. This study also confirmed that majority of the children were fed on plant foods such as starchy foods (89.6%; 96% CI [87.8-91.4]) and legumes and nuts (60.6%; 95% CI [41.6-62.4]) while very few ate flesh foods and eggs (Figure 1b3). The homogeneity in the consumption of these foods in the study limited the analysis of the association between women's empowerment dimensions and the specific food groups. Malapit et al. (2015) attributed limited variety of foods consumed in the rural household to Low food productivity diversity and Smith & Haddad (2015) showed that the wealth of the

household determines what resources are available in the household and what type of foods would be made available.

In conclusion, this section has shown that the association between support for violence against women and feeding children on starchy foods is mainly based on the lack of decision power among women who support violence. Such women live decision making in the hands of the partners who may have little understanding of the other foods that the child may need. On the other hand, the association between decision making empowerment dimensions and feeding children on dairy foods can be explained by the fact that women who make decisions can go against all social barriers to acquire foods such as milk and milk products for child feeding that may be considered expensive by others. Overall both associations in this analysis show that decision making empowerment and self-esteem are important in child diet diversity.

The lack of association between the women's empowerment dimensions and all other foods groups can be explained by the limited variance in the consumption of those foods, which limit its analysis of the association with test indicators.

5.3. Limitations and strengths of the study

This study had both strengths and weaknesses. An important strength is the use of a nationally representative sample to investigate the relationship between child diet diversity and women's empowerment dimensions, permitting our findings to be generalized to children in the whole of Zambia. The quality of DHS data is high because the investigators use standard tools and method for data collection, which makes it easy to compare results with other studies that use DHS data elsewhere.

However, some of the other research we cite in this study used different women's empowerment measurement methods from the ones used in this study which thereby limiting direct comparison of our results with such studies. In addition, since measurement of women's empowerment is illusive, it is also possible that

the data could have included limited child nutrition sensitive women's empowerment items. According to Malhotra and Schuler (2005) women's empowerment is believed to measure both behaviours and norms and is continually developing which means that the relevance of items may vary from one setting to another.

Another limitation worth mentioning is the use of standard 24-hour recall in collecting the dietary data in the ZDHS. This method is known to under report food consumption due to memory lapses on the part of the respondents or lack of knowledge of the foods on the standard list. Further, there is a likelihood of under reporting of types of foods items given to children due to extensive use of mixed food preparations recipes in Zambia. Literature recommends the use of interactive 24-hour recall to overcome such weakness (Liu, 2013; Thompson & Subar, 2008). However, these methods were not used during the collection of the ZDHS data. This would limit our interpretation of dietary diversity.

Although feeding practices could be associated with cultural and social perspectives, our study did not provide such evidence as detailed data on socio cultural aspects were not available in the dataset. In addition, our study did not control for the sickness of the children since child health can influence the consumption of certain foods.

CHAPTER 6. CONCLUSION AND RECOMMENDATIONS

Introduction

This study is the first of its kind to be undertaken in Zambia. The study provides an overview of the relationship between women's empowerment dimensions and child diet diversity. Women's empowerment is an important nutrition sensitive intervention currently under promotion as one of the scaling up nutrition interventions in Zambia. The aim of the study was twofold; to assess the association between women's empowerment dimensions and child diet diversity and to examine the relationship between women's empowerment dimensions and feeding children on food from specific food groups.

Despite evidence of positive associations between women's empowerment and child diet diversity in different countries, our study found that women's empowerment dimensions (identified using principle component analysis) were not associated with the child diet diversity. However, a weak association was established on the feeding of children on specific food groups. Decision making empowerment dimension and support for violence against women were related to feeding children on dairy foods and starchy foods respectively out of the seven specific food groups. This could possibly be due to observed homogeneity in the diets of the children in Zambia as the variance in the diets was low.

The study provides valuable information on other individual mother and child factors that are important in explaining child diet diversity and the feeding of children on specific foods groups that has been limited in the Zambian context. New insight is provided on the importance of social dimension and decision making in promoting the feeding children on starchy foods and milk products which needs to be targeted in making women's empowerment programs nutrition sensitive. .

Recommendations/Further research

The results of the current study provide information that will be important in integrating child nutrition into the women's empowerment programs. To achieve this, the following are recommended:

Women's empowerment programs should strengthen the decision making and social aspects of the women to enable them take positive actions in support of child feeding.

Empowerment programs should endeavour to provide knowledge on child nutrition as an integral part of the women's empowerment programs and integrate strategies that women should use to apply the knowledge they learn in the households.

Integration of child diet diversity promotion programs with the promotion of breast feeding is strongly recommended for the children to benefit from breast feeding and complementary feeding after six months of age. Attempts should be made to encourage women to add animal sources of foods to the diets of the children in order to increase the diet diversity of children.

A formative research is recommended to provide in-depth information on women's empowerment indicator items that are sensitive to nutrition in the local context.

Further research is encouraged to understand factors associated with the observed limited diversity in the diet of the Zambian children.

REFERENCES

Adeyemi, O., Afolabi, W.A., Ferguson, E., Hoyt, J., Lawal, H., Okunola, R.A., Webster, J. and Yohanna-Dzingina, C., 2015. *How to strengthen the Infant and Young Child Feeding (IYCF) programme in Northern Nigeria*. Nigeria. Available [Online] https://opendocs.ids.ac.uk/opendocs/handle/123456789/6906. Accessed 16/08/16.

Aemro, M., Mesele, M., Birhanu, Z., & Atenafu, A. 2013. 'Dietary diversity and meal frequency practices among infant and young children aged 6–23 months in Ethiopia: a secondary analysis of Ethiopian Demographic and Health Survey 2011'. *Journal of Nutrition and Metabolism*.

Agresti, A. 1984. *Analysis of Ordinal Categorical Data*. New York: Wiley.

Amugsi D.A, Mittelmark M.B, Oduro A. 2015. 'Association between Maternal and Child Dietary Diversity: An Analysis of the Ghana Demographic and Health Survey'. *PLoS ONE* 10:8: e0136748. doi:10.1371/*journal.pone*.0136748.

Asling-Monemi, K., R. Peña, M. C. Ellsberg, and L. A. Persson. 2003. 'Violence against Women Increases the Risk of Infant and Child Mortality: A Case-Referent Study in Nicaragua'. *Bulletin of the World Health Organization* 81:1: 10–16. Retrieved from www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2572309&tool=pmcentrez&rendertype=abst.

Arimond, M., Weismann, D., Becquey, E., Carriquiry, A., Daniels, M.C., Deitchler, M., Fanou- Fogny, N., Joseph, M.L., Kennedy, G., Martin-Prével, Y. & Torheim, L.E. 2010. 'Simple food group diversity indicators predict micronutrient adequacy of women's diets in 5 diverse, resource-poor settings'. *Journal of Nutrition and Metabolism* 140:11: 2059S–69S.

Batana, Y. M. 2013. 'Multidimensional measurement of poverty among women in Sub-Saharan Africa'. *Social Indicators Research* 112:2: 337-362.

Bertazzo, A., Ragazzi, E. and Visioli, F., 2016. 'Evolution of tryptophan and its foremost metabolites' concentrations in milk and fermented dairy products'. *Pharma Nutrition*, *4*:2: pp.62-67.

Beyene, M., Worku, A. G., & Wassie, M. M. 2015. 'Dietary diversity, meal frequency and associated factors among infant and young children in Northwest Ethiopia: a cross- sectional study'. *BMC Public Health* 15:1, 1-9. Doi: 10.1186/s12889-015-2333.

Bhagowalia, P., Menon, P., Ouisumbing, A.R. & Soundarajan, V. 2010. *Unpacking the links between women's empowerment and child nutrition: Evidence using nationally representative data from Bangladesh*. Paper presented at the Agricultural & Applied Economics Association 2010, Denver, CO.

Bhutta, Z.A., Das, J.K., Rizvi, A., Gaffey, M.F., Walker, N., Horton, S., Webb, P., Lartey, A., Black, R.E., Group, T.L.N.I.R. and Maternal and Child Nutrition Study Group, 2013. 'Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?' *The Lancet*, 382:9890: pp.452-477.

Black, R. E., Alderman, H., Bhutta, Z. A., Gillespie, S., Haddad, L., Horton, S., Victoria, C. G. 2013a. 'Maternal and child nutrition: building momentum for impact'. *The Lancet*, 382:9890: 372-375.

Black, R.E., Victora, C.G., Walker, S.P., Bhutta, Z.A., Christian, P., De Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R. and Uauy, R.,

2013b. 'Maternal and child undernutrition and overweight in low-income and middle-income countries'. *The lancet*, 382:9890: pp.427-451.

Blaney, S., Februhartanty, J. and Sukotjo, S., 2015. 'Feeding practices among Indonesian children above six months of age: a literature review on their potential determinants (part 2)'. *Asia Pacific Journal of Clinical Nutrition*, *24*:1: pp.28-37.

Bose' S. 2011. 'The effect of women's status and community on the gender differential in children's nutrition in India'. *Journal of Biosocial Science* 43:5: 513–533.

Brown, L. R., Feldstein, H. S., Haddad, L., & Peña, C. 1995. *Women: The key to food security.* Washington, DC: International Food Policy Research Institute.

Branca, F., Piwoz, E., Schultink, W., & Sullivan, L. M. 2015. 'Nutrition and health in women, children, and adolescent girls'. *Biomedical Journal* 351:h4173-h4173. doi:http://dx.doi.org/10.1136/*bmj*

Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and ICF International. (2014). *Zambia Demographic and Health Survey 2013-14*. Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF International.

Chapoto, A., Mbata, O.Z., Hoffman, B.D., Kabaghe, C., Sitko, N., Kuteya, A. & Zulu, .B. 2015. *The Politics of Maize in Zambia: Who holds the Keys to Change the Status Quo?* Working Paper 99 Available at: http://www.iapri.org.zm and http://www.aec.msu.edu/agecon/fs2/zambia/index.htm. Accessed on 1/08/1016.

Chigunta, F. and Mwanza, V. 2016. *Measuring and promoting youth entrepreneurship in Zambia. Young Entrepreneurs in Sub-Saharan Africa*. London & New York: Routledge:

Cincinnati Children's Hospital Medical Center. 2014. *Three of Four Heavily Breastfed Infants in Cincinnati Are Not Getting Needed Dietary Diversity Between 6 and 12 Months*. Available: http://www.cincinnatichildrens.org/news/release/2014/dietary-diversity-breastfed-infants. Accessed on 3/08/16.

Cliffer, C.R.I. 2008. *Women's Empowerment and Infant and Young Child Feeding in Bangladesh.* Master Thesis, Emory University.

Cunningham, K., Ruel, M., Ferguson, E. and Uauy, R., 2015. 'Women's empowerment and child nutritional status in South Asia: a synthesis of the literature.' *Maternal & child nutrition 11*:1: pp.1-19.

De Vaus, D. 2013. *Surveys in Social Research*: New York: Routledge.

Dewey K.G. & Adu-Afarwuah S. 2008. 'Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries'. *Maternal & Child Nutrition* 4 (Suppl. 1): 24–85.

Dewey K.G. & Begum K. 2011. 'Long-term consequences of stunting in early life'. *Maternal & Child Nutrition* 7 (Suppl. 3): 5–18.

Feiruz. Y. & Fanaye, T. 2015. *Synopsis: Women's empowerment in agriculture and dietary diversity in Ethiopia. ESSP II Research Note 55*. Washington, D.C. and Addis Ababa, Ethiopia: International Food Policy Research Institute (IFPRI) and Ethiopian Development Research Institute (EDRI). http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130335

Field, A. 2013. *Discovering Statistics using SPSS (4th Ed.*). London: Sage

Flax, V. L., Hamela, G., Mofolo, I., Hosseinipour, M. C., Hoffman, I. & Maman, S. 2016. *Infant and Young Child Feeding Counseling, Decision-Making, and Practices Among HIV-Infected Women in Malawi's Option B+ Prevention of Mother-to-Child Transmission Program: A Mixed Methods Study. AIDS and Behavior*, 1-12.

Food and Agricultural Organization (FAO) and FHI 360. (2016). *Minimum Dietary Diversity for Women: A Guide for Measurement.* Rome: FAO.

Food and Agricultural Organization (FAO). 2011a. *The State of Food and Agriculture 2010–2011. Women in Agriculture: Closing the Gender Gap for Development*. Rome: Food and Agriculture Organization of the United Nations (FAO).

Food and Agriculture Organization (FAO). 2011b. *Guidelines for measuring household and individual dietary diversity*. Rome, FAO.

Food and Nutrition Technical Assistance (FANTA). 2006. FANTA Project. *Working Group on Infant and Young Child Feeding Indicators. Developing and validating simple indicators of dietary quality and energy intake of infants and young children in developing countries: summary of findings from analysis of 10 data sets.* Washington: Academy for Educational Development.

Halimatou, A., Kohler, L., Taren, D., Mofu, M & Chileshe, J. 2014. *Zambia food consumption and micronutrient status survey report.* Lusaka, Zambia: National Food and Nutrition Commission.

Hashemi,S. M. & Schuler, R.S. 1993. *Defining and Studying Empowerment of Women: A Research Note from Bangladesh*. Working Paper No.3. Arlington, Virginia

Hotz, C., Palaniappan, U., Chileshe, J., Kafwembe, E., & Siamusantu, W. (2011). *Nutrition Survey in Central and Eastern Provinces, Zambia 2009: Focus on Vitamin A and Maize Intakes, and Vitamin A Status among Women and Children*. Lusaka, Zambia, Washington, DC, and Ndola, Zambia: National Food and Nutrition Commission (NFNC), HarvestPlus, and Tropical Diseases Research Centre (TDRC).

Joshi N, Agho KE, Dibley MJ, Senarath U, Tiwari K. 2015. 'Determinants of inappropriate complementary feeding practices in young children in Nepal: secondary data analysis of Demographic and Health Survey 2006'. *Maternal child Nutrition* 8 (Suppl) 1:45–59.

Kabeer, N. 1999. 'Resources, agency, achievements: reflections on the measurement of women's empowerment'. *Development Change* 30: 435–464.

Kabir, I., Khanam M., Agho, K.E., Mihrshahi, S, Dibley, M.J, Roy, S.K. 2012. 'Determinants of inappropriate complementary feeding practices in infant and young children in Bangladesh: secondary data analysis of Demographic Health Survey 2007'. *Maternal and Child Nutrition*; 8 (Suppl 1):11–27.

Katepa-Bwalya, M., Mukonka, V., Kankasa, C., Masaninga, F., Babaniyi, O., & Siziya, S. 2015. 'Infants and young children feeding practices and nutritional status in two districts of Zambia'. *International Breastfeeding Journal*: 10: 5. http://doi.org/10.1186/s13006-015-0033.

Kavle, J.A., Mehanna, S., Saleh, G., Fouad, M.A., Ramzy, M., Hamed, D., Hassan, M., Khan, G. and Galloway, R. 2015. 'Exploring why junk foods are 'essential 'foods and how culturally tailored recommendations improved feeding in Egyptian children'. *Maternal & child nutrition*, 11:3: pp.346-370.

Kearney, J. 2010. *Food consumption trends and drivers. Review. Philosophical transaction of. Royal. Society* B.365, 2793–2807 Available [Online] http://rstb.royalsocietypublishing.org doi:10.1098/rstb.2010.0149 / Accessed 11/08/16.

Lannotti, L., Muehlhoff, E. and Mcmahon, D., 2013. 'Review of milk and dairy programmes affecting nutrition'. *Journal of Development Effectiveness 5*:1: pp.82-115.

Lannotti L.L., Robles M., Pachon H. & Chiarella C. 2012. 'Food prices and poverty negatively affect micronutrient intakes in Guatemala.' *The Journal of Nutrition* 142: 1568–1576.

Lartey, A., Marquis, G.S., Mazur, R., Perez-Escamilla, R., Brakohiapa, L., Ampofo, W., Sellen, D. and Adu-Afarwuah, S., 2014. 'Maternal HIV is associated with reduced growth in the first year of life among infants in the Eastern region of Ghana: the Research to Improve Infant Nutrition and Growth (RIING) Project'. *Maternal & child nutrition* 10:4: pp.604-616.

Leroy, J. L., M. Ruel, and E. Verhofstadt. 2009. 'The Impact of Conditional Cash Transfer Programmes on Child Nutrition: A Review of Evidence Using a Programme Theory Framework.' *Journal of Development Effectiveness* 1:2:103–129. Doi: 10.1080/19439340902924043.

Liu, W.H., 2013. *Feeding attitudes, practices and traditional dietary beliefs of Chinese mothers with young children in Australia: a mixed methods study*. PHD Thesis. Australia: Queensland University of Technology.

Malapit, H.J.L., Kadiyala, S., Quisumbing, A.R., Cunningham, K. and Tyagi, P., 2015. 'Women's empowerment mitigates the negative effects of low production diversity on maternal and child nutrition in Nepal'. *The Journal of Development Studies* 51:8: pp.1097-1123.

Malapit, H.J.L. & Quisumbing, A. R. 2015. ‘What dimensions of women’s empowerment in agriculture matter for nutrition in Ghana?’ *Food Policy* 52: 54–63.

Malapit, H. J., Sproule, K., Kovarik, C., Meinzen-Dick, R. S., Quisumbing, A. R., Ramzan, F., Alkire, S. 2014. *Measuring progress toward empowerment: Women's empowerment in agriculture index: Baseline report*: International Food Policy Research Institute, Washington DC: USA.

Mallard, S.R. Lisa A. Houghton, L.A., Filteau, S., Mullen, A., Nieuwelink, J., Chisenga, M. Siame, J. & Gibson3, R. S. 2014. ‘Dietary Diversity at 6 Months of Age Is Associated with Subsequent Growth and Mediates the Effect of Maternal Education on Infant Growth in Urban Zambia’. *The Journal of Nutrition Community and International Nutrition* 144: pp1818–1825.

Malhotra A & Schuler S.R. 2005. *Women’s empowerment as a variable in international development. In Measuring Empowerment: Cross-Disciplinary Perspectives*. Washington, DC: World Bank.

Malhotra, A., Schuler, S.R., & Boender, C. 2002. *Measuring Women’s Empowerment as a Variable in International Development*. Gender and Development group. World Bank.

McGuire, S., 2015. ‘World Health Organization. Comprehensive Implementation Plan on Maternal, Infant, and Young Child Nutrition’. Advances in Nutrition: *An International Review Journal* 6:1: pp.134-135.

Mugode, R.H., Nthani, D., Bwalya, B.B. & Amanzi, P. 2008. *The World breast feeding Trends Initaitve: Zambia country Assessment report*. Lusaka; Zambia:

National Food and Nutrition Commission (NFNC), (International Baby Friendly Association Network (IBFAN).

Musaad, S.M., Donovan, S.M., Fiese, B.H. and STRONG Kids Research Team, 2015. 'Parental perception of child weight in the first two years-of-life: a potential link between infant feeding and pre scholars' diet. *Appetite 91*, pp.90-100.

Na, M., Jennings, L., Talegawkar, S. A., & Ahmed, S. (2015). 'Association between women's empowerment and infant and child feeding practices in sub-Saharan Africa: an analysis of Demographic and Health Surveys.' *Public Health Nutrition* 18:17: 3155-3165 3111p. Doi: 10.1017/S1368980015002621.

Nair, M., Ariana, P., & Webster, P. 2014. 'Impact of mothers' employment on infant feeding and care: a qualitative study of the experiences of mothers employed through the Mahatma Gandhi National Rural Employment Guarantee Act.' *Bio Medical Journal open* 4:4: e004434.

Nankumbi, J. and Muliira, J.K., 2015. 'Barriers to infant and child-feeding practices: a qualitative study of primary caregivers in Rural Uganda'. *Journal of health, population, and nutrition 33*:1: p.106.

National Food and Nutrition Commission (NFNC). 2014. *Communication strategy and implementation: First 1000 MCD communication strategy & implementation Plan (July 2014- December 2016)*. Lusaka, Zambia: National Food and Nutrition Commission (NFNC).

National Food and Nutrition Commission (NFNC). 2011. *National Food and Nutrition Strategic Plan 2011-2015 for Zambia*. Lusaka, Zambia: National Food and Nutrition Commission (NFNC).

National Food and Nutrition Commission (NFNC). 2003. Report of the national survey to evaluate the impact of vitamin A interventions in Zambia in July and November 2003. Lusaka, Zambia: UNICEF.

PAHO/WHO. (2003). *Guiding Principles for Complementary Feeding of the Breastfed Child*. Washington, DC: PAHO/World Health Organization (WHO).

Patel, S.J., Patel M.D., Patel J.H., Patel A.S. & Gelani R.N. 2016. 'Role of women gender in livestock sector: A review.' *Journal of Livestock Science* (ISSN online 2277-6214) 7: 92-96. Accessed 16/08/2016.

Paul, K. H., Muti, M., Khalfan, S. S., Humphrey, J. H., Caffarella, R., & Stoltzfus, R. J. 2011. 'Beyond food insecurity: how context can improve complementary feeding interventions'. *Food and Nutrition Bulletin* 32:3: 244-253.

Quisumbing, A. R. 2003. *Household decisions, gender, and development: A synthesis of recent research*. Washington, DC: International Food Policy Research Institute.

Ruel, M.T., Alderman, H. and Maternal and Child Nutrition Study Group, 2013. 'Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition*?' The Lancet* 382:9891: pp.536-551.

Sanders, C.K., 2015. 'Economic Abuse in the Lives of Women Abused by an Intimate Partner A Qualitative Study. Violence against women.' *Sage Journal* 21:1: pp.3-29.

Sanghvi, T., Haque, R., Roy, S., Afsana, K., Seidel, R., Islam, S., Jimerson, A. and Baker, J., 2016. 'Achieving behavior change at scale: Alive & Thrive's

infant and young child feeding program in Bangladesh'. *Maternal & child nutrition* 12:S1: pp.141-154.

Senarath U, Godakandage SS, Jayawickrama H, Siriwardena I, Dibley MJ. 'Determinants of inappropriate complementary feeding practices in young children in Sri Lanka: secondary data analysis of demographic and health survey 2006–2007.2012'. *Maternal Child Nutrition* 8:s1:60–77.

Sen, B. & Begum, S. 2015. 'Women's Empowerment, Maternal Nutrition and Chronic Poverty: Further Evidence from Bangladesh'. *Bangladesh Development Studies* XXXVIII: 2.

Semahegn, A., Tesfaye, G. Bogale, A. 2014. 'Complementary feeding practice of mothers and associated factors in Hiwot Fana Specialized Hospital, Eastern Ethiopia'. *Pan African Medical Journal* 18:143 Available [Online] (www.panafrican-med-journal.com. doi:10.11604/pamj.2014.18.143.3496. Accessed 24/08/16.

Schuler, S.R., Islam, F. & Rottach, E. 2010. 'Women's empowerment revisited: a case study from Bangladesh.' *Development Practice* 20: 840–854.

Shroff, M., Griffiths, P., Adair, L., Suchindran, C. and Bentley, M., 2009. 'Maternal autonomy is inversely related to child stunting in Andhra Pradesh, India'. *Maternal & Child Nutrition 5*:1: pp.64-74.

Shroff, M.R., Griffiths, P.L., Suchindran, C., Nagalla, B., Vazir, S. and Bentley, M.E., 2011. 'Does maternal autonomy influence feeding practices and infant growth in rural India?' *Social Science & Medicine 73*:3: pp.447-455.

Smith, L. C. & Haddad, L. 2015. 'Reducing child undernutrition: past drivers and priorities for the post-MDG Era.' *World Development* 68: 180-204.

Smith, L.C., Ramakrishnan, U., Ndiaye, A., Haddad, L.J., Martorell, R. 2003. *The importance of women's status for child nutrition in developing countries. IFPRI Research Report No. 131.* International Food Policy Research Institute, Washington DC: USA.

Stewart, C.P., Iannotti, L., Dewey, K.G., Kim, F. M. & Onyango, A. 2013. 'Contextualising complementary feeding in a broader framework for stunting prevention.' *Maternal Child Nutrition* 9: 27–45. Washington, DC.

Wilson SM*,* Sato AF. 2014. Stress and paediatric obesity: what we know and where to go*. Chemphyschem* 15*:* 91–102*.*

Stevens, G.A., Bennett, J.E., Hennocq, Q., Lu, Y., De-Regil, L.M., Rogers, L., Danaei, G., Li, G., White, R.A., Flaxman, S.R. and Oehrle, S.P. 2015. 'Trends and mortality effects of vitamin A deficiency in children in 138 low-income and middle-income countries between 1991 and 2013: a pooled analysis of population-based surveys.' *The Lancet Global Health 3:*9: pp.e528-e536.

Sobkoviak, R. M., Yount, K. M., & Halim, N. 2012. 'Domestic violence and child nutrition in Liberia'. *Social Science & Medicine*, *74:2*: 103-111.

Tadesse, M., Teklie, H., Yazew, G., & Tesfayi G. T. 2013. *Women's Empowerment as a Determinant of Contraceptive Use in Ethiopia. Further Analysis of the 2011 Demographic and Health Survey. DHS Further Analysis Reports No. 82.*Calverton, Maryland, USA: ICF International.

Thompson, F.E. and Subar, A.F., 2008. 'Dietary assessment methodology'. *Nutrition in the Prevention and Treatment of Disease* 2: pp.3-39.2013.

United Nations Children's Fund UNICEF, 1990. *Strategy for Improved Nutrition of Women and Children in Developing Countries. United Nations Children's Fund.* New York: UNICEF.

United Nations Children's Fund (UNICEF), World Health Organization (WHO), World Bank. (2012). *Joint Child Malnutrition Estimates*. UNICEF, New York; WHO, Geneva; the World Bank, Washington.

United States Aid (USAID). 2011. *Integration of nutrition education into the Ethiopia Urban Gardens Program: results of recipe trials and focus group discussions. Infant and Young Child Nutrition Project*. Available:[Online] http://iycn.wpengine.netdna-cdn.com/files/IYCN-Ethiopia-RT-FGD-Report-07111.pdf. Accessed 04/08/2016.

Van den Bold, M., Quisumbing, A. R., & Gillespie, S. 2013. *Women's empowerment and nutrition: an evidence review*. International Food Policy Research Institute (IFPRI) Washington DC: USA. Discussion Paper 01294. Available at SSRN: http://ssrn.com/abstract=2343160 or http://dx.doi.org/10.2139/ssrn.2343160.

Victora, C.G., de Onis, M., Hallal, P.C., Blössner, M. and Shrimpton, R., 2010. 'Worldwide timing of growth faltering: revisiting implications for interventions'. *Pediatrics* 125: 473–480.

Vitta, B. S., Benjamin, M., Pries, A. M., Champeny, M., Zehner, E., and Huffman, S. L. 2016. 'Infant and young child feeding practices among children under 2 years of age and maternal exposure to infant and young child feeding messages and promotions in Dar es Salaam, Tanzania'. *Maternal & Child Nutrition* 12: 77–90. Doi: 10.1111/mcn.12292.

Weisz A., Meuli G., Thakwalakwa C., Trehan I., Maleta K. & Manary M. .2011. 'The duration of diarrhea and feveris associated with growth faltering in rural Malawian children aged 6–18 months'. *Nutrition Journal 10: 25.*

Williams, J. 2005. *Measuring gender and women's empowerment using confirmatory factor analysis*. Population Program, Institute of Behavioural Science, University of Colorado, Boulder.

World Health Organization, United Nations Children's Fund. 2016. *Guideline: updates on HIV and infant feeding: the duration of breastfeeding and support from health services to improve feeding practices among mothers living with HIV.* Geneva: World Health Organization.

World Health Organization (WHO). 2010. *Indicators for assessing infant and young child feeding practices; Part 3 Country profiles*. Geneva: WHO Press.

World Health Organization (WHO). 2010. *Guidelines on HIV and infant feeding: principles and recommendations for infant feeding in the context of HIV and a summary of evidence*. Geneva, WHO, 2010.

Wyatt, A.J., Yount, K.M., Null, C., Ramakrishnan, U., & Girard, A.W. 2015. 'Dairy intensification, mothers and children: An exploration of infant and young child feeding practices among rural dairy farmers in Kenya'. *Maternal and Child Nutrition*. 11: pp 88–103.

Yimer, F. and Tadesse, F., 2015. *Women's empowerment in agriculture and dietary diversity in Ethiopia (No. 80).* International Food Policy Research Institute (IFPRI).

Ziaei, S., Naved, R. T., & Ekstrom, E. C. 2012. 'Women's exposure to intimate partner violence and child malnutrition: findings from demographic and health surveys in Bangladesh'. *Maternal Child Nutrition*. Doi: 10.1111/j.1740-8709.2012.00432.

APPENDICES

Appendix 2.1: The composition of the seven food groups for child diet diversity

(1) Grain, roots and tubers.

The foods in this groups includes white-fleshed plantains roots and tubers, all types of cereal and cereal products (FAO & FHI 2016).

(2) Legumes and nuts

The legumes and nuts food group include foods that come from a plant family Fabaceae (alternate name Leguminoseae), such as beans, peas groundnut (peanut), common bean (black, kidney, pinto), broad bean (fava, field bean), chickpea (garbanzo), pigeon pea, cowpea, lentil and soybean/soybean products or other legume products and lentils which are mainly seeds. The food group provide high protein and B vitamins. The foods in this group also has low fat content (FAO & FHI 2016).

(3) Dairy products.

The foods in this group are known by their provision of high-quality protein, potassium and calcium, as well as vitamin B12 (available only from animal-source foods) and other micronutrients. This group includes almost all liquid and solid dairy products from cows, goats, buffalo, sheep or camels. Tinned, powdered milk, soft and hard cheeses and yoghurt and kefir are also included. It does not however include butter, cream and sour cream, ice cream, sweetened condensed milk and processed/ packaged "yoghurt drinks" because of their high sugar content which places them under sugary foods group (FAO & FHI 2016).

(4) Flesh foods

Flesh foods includes red meat, organ meats processed meat, insect's poultry, other birds and fresh and dried fish and seafood/shellfish, wild animal ("bush

meat"), snakes, frogs and other reptiles and amphibians. All flesh foods are important sources of high-quality protein and bioavailable micronutrients (FAO & FHI 2016).

(5) Eggs

This group includes eggs from any type of bird (domesticated poultry and wild birds). Eggs are a good source of protein and micronutrients (FAO & FHI 2016).

(6) Vitamin A rich fruits and vegetables

Essentially includes all medium-to-dark green leafy vegetables. These includes Chinese cabbage, romaine, along with darker greens, cassava leaves, bean leaves, pumpkin leaves, amaranth leaves and others. Fruits rich in vitamin A such as ripe mango and ripe papaya, red palm fruit/pulp, passion fruit, apricot and several types of melon, orange fleshed roots and tubers are included in this group (FAO & FHI 2016).

(7) Other fruits and vegetables.

This group includes most fruits and vegetables excluded from the vitamin A-rich foods groups fruits. As with vegetables, commonly consumed fruits vary widely with geography and can include foliaged as well as cultivated fruits, iceberg lettuce, tomato and okra (all fruits in botanical terms) other local vegetables such as cabbage cucumbers, green peas , tomatoes, cauliflower (FAO & FHI 2016).

Appendix 3.1a: Sample description

Table 1a1: Mean household size and average ages of target household members

	Mean	SD	Median	Minimum	Maximum	CI
Household size	6.4	2.7	6.0	2	23	6.3 - 6.5
Husband/partner's age	34.3	8.2	33.0	18	95	34.0 - 34.6
Age of household head	35.9	9.8		18	93	35.5 - 36.2
Women's age in years	28.3	6.7	28.0	15	48	28.0 - 28.5
Number of living children	3.6	2.1		1	13	3.6 - 3.7
Total children ever born	4.0	2.5	4.0	1	15	4.0 - 4.1
Child's age in months	14.5	5.1	15.0	6	23	14.3 - 14.7
Birth order number	4.0	2.5	3.0	1	15	3.8 - 4.1
Birth weight	3.2	.6	3.2	.8	6.3	3.2-3.2

Table 1a2: Economic activities of the women

		Frequency	Percent	Lower CI	Upper CI
Working status in past 12 months	No	1342	42.8	41.0	44.6
	In the past year	125	4.0	2.2	5.8
	Currently working	1627	51.9	50.1	53.7
	On leave last 7 days	42	1.3	-0.5	3.1
Current woman's work status	not working	1342	42.8	40.5	45.1
	professional	118	3.8	1.5	6.1
	Clerical/skills jobs	506	16.1	13.8	18.4
	agricultural	1097	35.0	32.7	37.3
	other unskilled	74	2.3	0.0	4.6
woman work places	At home	423	23.7	21.4	26.0
	Away	1363	76.3	74.0	78.6
Who the woman works for	For family member	260	14.5	12.2	16.8
	For someone else	196	11.0	8.7	13.3
	Self-employed	1335	74.5	72.2	76.8
Type of Payments for the job	Not paid	780	43.5	41.2	45.8
	Cash only	876	48.9	46.6	51.2
	Cash and in-kind	112	6.3	4.0	8.6
	In-kind only	23	1.3	-1.0	3.6
Woman work schedules	All year	583	32.5	30.2	34.8
	Seasonal	1081	60.3	58.0	62.6
	Occasional	128	7.1	4.8	9.4
Woman's earnings relative to the husband's or partner	More than him	9	9.1	6.0	12.2
	Less than him	700	71.1	68.0	74.2
	About same	164	16.6	13.5	19.7
	No money brought	23	0.7	2.4	3.5
	Don't know	8	0.3	2.8	3.4
Literacy level	Cannot read at all	1356	43.4	41.7	45.1
	Able to read abit	324	10.4	8.7	12.1
	Able to read well	1438	46.0	44.3	47.7
	No card with required language	6	.2	-1.5	1.9
	visually impaired	3	.1	-1.6	1.8
Frequency of listening to radio	Not at all	1289	41.1	39.4	42.8
	Less than once a week	307	9.8	8.1	11.5
	At least once a week	544	17.4	15.7	19.1
	Almost every day	992	31.7	30.0	33.4
Frequency of watching Television	Not at all	2065	65.9	64.2	67.6
	Less than once a week	150	4.8	3.1	6.5
	At least once a week	175	5.6	3.9	7.3
	Almost every day	746	23.8	22.1	25.5

Table 1a3: Educational attainment of women and their partners

	Women's education			Husband or partners' education		
Educational level	**%**	**Lower CI**	**Upper CI**	**%**	**Lower CI**	**Upper CI**
No education	11.0	9.2	13	6.9	5.1	8.7
Primary	57.3	55.5	59	42.4	40.6	44.2
Secondary	27.7	25.9	30	42.4	40.6	44.2
Higher	4.0	2.2	6	6.4	4.6	8.2

Appendix 3.1b: Relationship between women empowerment and household demographic and individual characteristics of the women, partners and children

Decision making among women

The women's decision making on various aspect was assessed in the sample. The results in table 1b1 shows that women made most decisions on households purchases for daily needs by themselves (61.6%;95%CI [59.8-63.4]) while the other decisions on matters were made jointly with their partners including the decision for woman's visit to family. The results mean that women rarely made decisions by themselves since almost all decisions were made jointly.

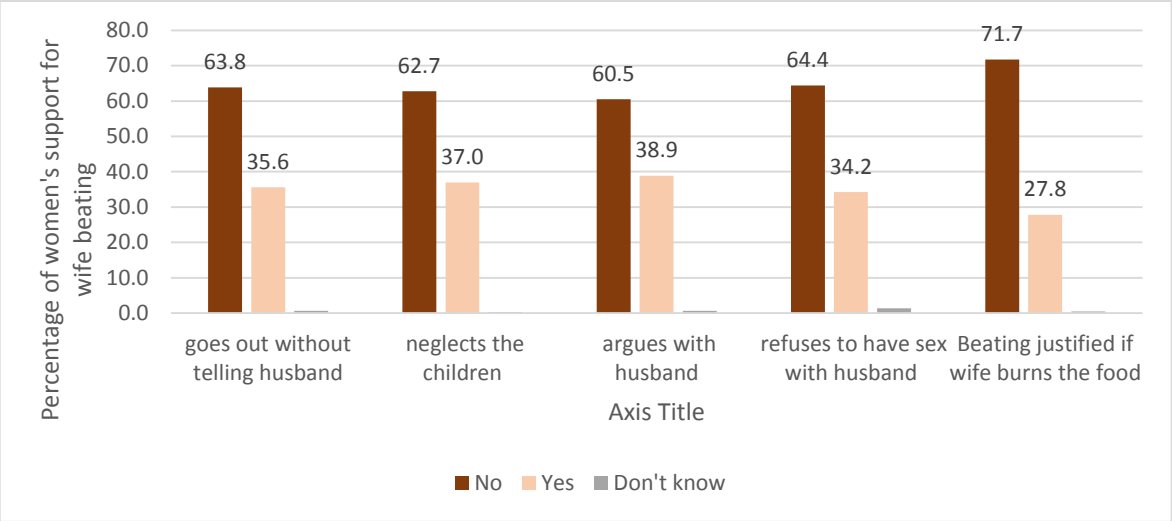
Table 1b1: Decision making of the women

Person who Decision		n	%	Lower CI	Upper CI
Woman's health care	Woman	977	31.2	28.1	34.3
	Jointly	1279	40.8	38.1	43.5
	Husband/partner alone	859	27.4	24.1	30.7
Large household purchases	Woman	321	10.3	30	33.6
	Jointly	1615	51.6	45.9	49.5
	Husband/partner alone	1188	37.9	18.7	22.3
	Someone else	5	.2	-1.8	1.8
Household purchases for daily needs	Woman	1931	61.6	59.8	63.4
	Jointly	748	23.9	22.1	25.7
	Husband/partner alone	444	14.2	12.4	16
	Someone else	9	.3	-1.5	2.1
Visits to family or relatives	Woman	585	18.7		
	Jointly	1734	55.4	16.9	20.5
	Husband/partner alone	803	25.6	53.6	57.2
	Someone else	8	.2	23.8	27.4
	Other	2	.1	-1.6	2
Person who usually decides what to do with money husband earns	Woman	249	8.0	6.2	22.3
	Jointly	1724	55.5	53.7	59
	Husband/partner alone	1039	33.4	31.6	29.2
	Other	2	.1	-1.7	3.8
	Husband/partner has no earnings	95	3.1	2.3	3.7
Person who usually decides how to spend respondent's earnings	Woman	313	31.8	30	33.6
	Jointly	470	47.7	45.9	49.5
	Husband/partner alone	202	20.5	18.7	22.3

The results in Figure 1b1 show that 71.7% (95% CI [69.9-73.5]) of the women in the sample felt that wife beating was not justified when she burned food and

38.9% (95%CI[26.0-29.6]) felt that wife beating was justified when the woman argued with the husband or partner with their partners.

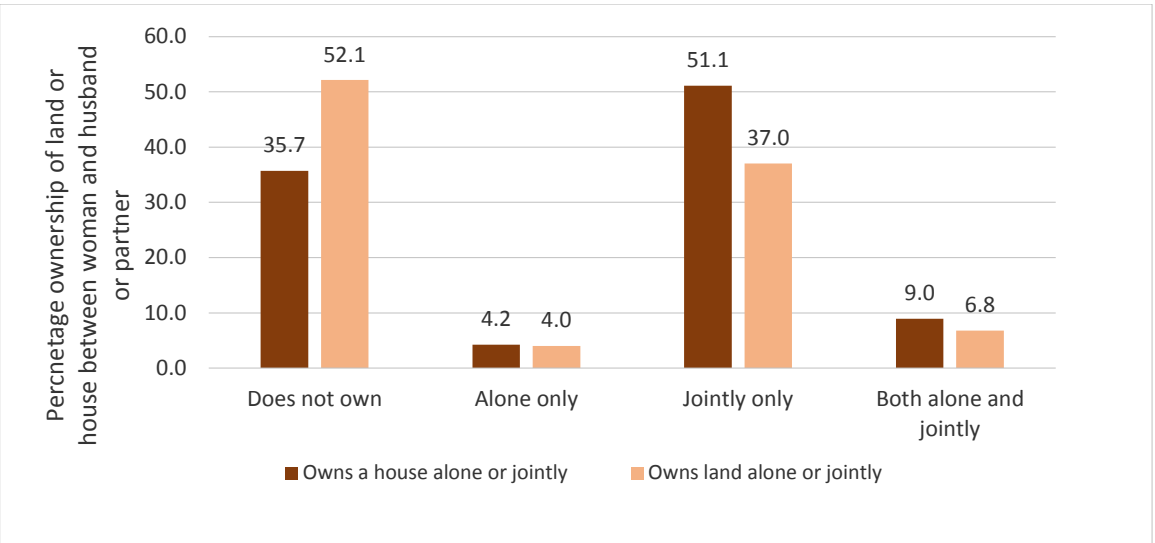
Figure 1b1: Justification of wife beating among women



Ownership of assets

Assets ownership among women was mainly jointly than alone. The result in Figure 1b2 shows that 51.1% (95% CI [49.3-52.9]) of the women owned houses jointly with the husband or partner and 37.0% (95% CI [35.2-38.8]) owned land jointly. Ownership of land and house by women alone was very low (4.2%; 95% [2.4-6.0]) and (4.0%; 95% CI [2.2 -5.8]) respectively. This suggests that joint ownership of assets was more common in the sample than individual ownership.

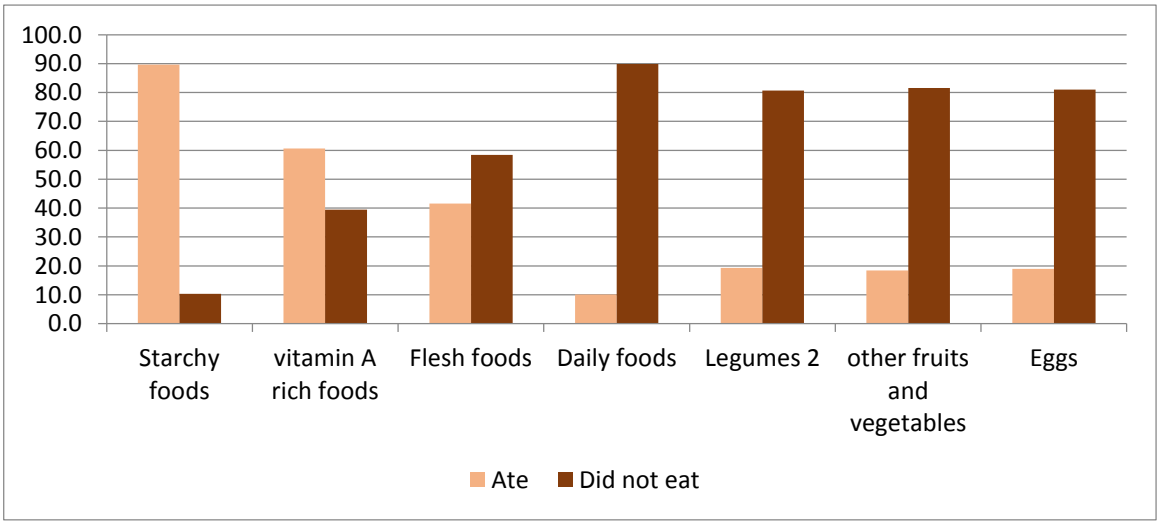
Figure 1b2: Ownership of Houses and land among women



Feeding of children on different food groups.

The results in Table 5 shows that 2802 (89.6%; 95% CI [87.8 – 91.4] of children were fed on starchy foods and 1894 (60.6%; 95% CI [41.6 -62.4]) were fed them on vitamin A rich foods. Additionally 2804(89.9; 95% CI [77.8-91.7] children were not fed on daily products (Figure 1b3).The results suggest that the children's diet is mainly starchy based and most of the protein sources of foods were lacking in the diets of the children.

Figure 1b3: Children's consumption of the seven food groups



Appendix 3.1c: Relationships between demographic, individual characteristics and child diversity

Household demographic characteristics and child diet diversity.

The relationship between region in which the women and children lived and dietary diversity was assessed. The results show that children who lived in urban areas were fed on an average of 2.9 food groups (SD=1.6) while those in the rural areas were fed on an average of 2.4 food groups (SD = 1.3). An independent samples t-test was performed to compare child diet diversity and the region in which the child lived. Statistically significant differences were found between children diet diversity score and the region in which the child lived [t (1781.277) = 8.367, $p < 0.001$]. The measure of effect measured using eta squared was small (eta = 0.024), meaning that living in urban areas only explained 2.4% of child diet diversity.

The assessment of the relationship between gender of the household head in the houses were women and children lived and dietary diversity score showed that children in male headed households ate an average of 2.5 food groups (SD 1.4) compared to 2.6 food groups (SD=1.4) in female headed households. The assessment of the relationships between gender of household head and child diet diversity showed no statistically significant differences between gender of the household head and child dietary diversity score ($p>0.05$). This result show that there were no differences in the feeding of food groups to children between the male headed and female headed households.

A Pearson product moment correlation coefficient was used to examine the association between age of the household head and child diet diversity. Statistically significant positive correlation was found between child diet diversity score and mean age of the household head was found [$r=0.095$, $N=3136$, $P<0.001$]. The result indicate that older household heads were associated with giving children diverse diets (Appendix 2b7). The coefficient of determination for

this correlation was r^2= 0.009, indicating a very small relationship (Cohen 1988) as it only explained the variance of 0.9% of the child diet diversity.

The relationship between number of people in the households and child diversity was examined using a Pearson product moment correlation coefficient. Statistically significant positive correlation between child diet diversity score and household mean size were found [r=.0039, N=3136, p=0.028], suggesting that a higher number of household members tend to be associated with a higher child diet diversity score (Appendix 2b5). The coefficient of determination for this correlation was r^2= 0.0015, indicating a very small relationship (Cohen 1988) as it only explained 0.2% of the child diet diversity score.

The relationship between the household wealth and child dietary diversity score was assessed using a one way ANOVA test. Statistically significant differences were observed on the child diet diversity and the five household wealth sub groups [F (4, 3131) =40.155, P<0.001]. The measure of effect using eta squared showed that the effect was almost moderate (eta squared =0.049) (Cohen's 1988), showing that the household wealth explained 5% of child diet diversity score. The post hoc test of comparison using Turkey HSD revealed that differences existed among the poorest (M=2.3; SD=1.6) and the richer (2.7 ;SD1.5); between the poorest and the richest (3.3,SD= 1.6); between the poorer (M=2.4, SD=1.4) and the richest; the richest and the middle (M=2.5,SD=1.4) and between the richer and the richest The results show that richest households fed their children on significantly more diverse diet than any of the other wealth categories.

Table 2a1: Household wealth and child dietary diversity score

	N	Mean	Std. Deviation	Lower Bound	Upper Bound
Poorest	784	2.30	1.2	2.21	2.39
Poorer	737	2.40	1.4	2.30	2.50
Middle	631	2.47	1.4	2.36	2.58
Richer	535	2.77	1.5	2.64	2.90
Richest	449	3.25	1.6	3.10	3.40
Total	3136	2.58	1.4	2.52	2.63

Women's characteristics and child dietary diversity

The woman's age and child diet diversity score was found to have a relationship. Using Pearson product moment correlation coefficient, a statistically significant positive correlation was found between child diet diversity score and mother's age [r=.07, N=3136, p<0.001] suggesting that older mothers were likely to feed children a diversified diet than younger ones (Appendix 2b1). The measure of effect for this relationship was however small (r^2= 0.0049) (Cohen 1988), explaining only 0.5% of child dietary diversity score.

The relationship between woman's education attainment and child diet diversity score was assessed using the one way ANOVA. The results indicate statistically significant differences between women's educational attainment groups and child diet diversity score [F (3,469.667) =34.494, P<0.001]. The measure of effect for this relationship was small (eta squared=0.034) (Cohen's 1988), this explained 3% of the variance in child's dietary diversity. Differences in child diversity among the groups was explored using the post hoc test of comparison. The Turkey HSD test showed differences in child diet diversity between children whose mothers had no education (M=2.4, SD=1.3), those who went up to secondary education (M=2.9, SD=1.6) and those that attained higher educations (M=3.7, SD=1.6), between women who attained primary education (M=2.4, SD=1.3), those that went to secondary and higher. Further women who attained secondary education fed their children differently from those that went to primary and higher education. These result show that child diet diversity improved with an increase in the mother's educational attainment.

The woman's literacy was found to be associated with child diet diversity. A one way ANOVA test showed statistically significant differences between the five women's literacy groups and child dietary diversity score [F(4.11.591)=15.946,P<0.001]. The effect size of this relationship was found to be small (eta squared =0.02), as it only explained 2% of the variance in child dietary diversity. The post hoc test of comparison using Turkey HSD revealed differences between children's diet diversity of women who could not read at all (M=2.4, SD+1.3) and of those that were able to read (M=2.8, SD=1.5) and differences were also observed in child diet diversity for women who were able to read and those that were partly able to ready (M=2.4, SD=1.3). The result suggest that women who were able to read were likely to feed their children a much more varied diet than those that could not read at all or those that partly read, and no differences in the child diversity was observed for children whose mothers were partly able to read and those who could not read at all.

The relationship between women's work status and child diet diversity score was assessed using one way ANOVA and, the results showed statistically significant differences between child diet diversity score and the five categories of women's work status [F(4,343.499)=20.093, P<0.001]. However, this relationship was found to be small (eta squared =0.03) (Cohen's 1988), as it explained only 3% of the variance in child dietary diversity. The Post hoc test of comparison using Turkey HSD indicated that mother who were not working fed their children differently (2.5;SD=1.4) from those that were in professional jobs (M=3.6,SD=1.7) and those in clerical and service jobs (M=2.8, SD=1.4). In addition, differences were also observed in the diversity of children's diet whose mothers worked as professional and those in clerical and services job, Agricultural (M=2.4,SD=1.3) and other unskilled jobs (M=2.9,SD=1.4). Further, women who were in agricultural jobs fed their children differently from those in clerical and service jobs and other unskilled jobs. The results indicate that women who worked in professional jobs fed their children a much more diverse diet than the

women in any other type of jobs. However, the women in agricultural jobs provided the most little varied diets to children.

The women's working status in the 12 months preceding the survey was found to have an effect on the child's dietary score. A one way ANOVA showed that these differences were statistically significant for categories of mother's work status in the year and child diet diversity score [F (3, 3131) =3.798, P=0.01] the measure of effect size of this relationship was found to be small (eta squared =0.004) (Cohen's 1988), explaining only 0.4% of the variance in child dietary diversity score. The post hoc test Turkey HSD showed that children whose mothers did not work (M=2.5, SD=1.4) were fed differently from those whose mothers had a job and were on leave in the previous 7 days (M=3.1, SD=1.7) and differences were also observed on child's diet diversity for children whose mothers worked in the past year (M=2.4, SD=1.4) and those that had a job but were on leave in the previous 7 days. The results suggest that children whose mothers had a job but were just on leave were fed on a more diverse diet that those that were currently working or those that were not working or worked in the past year. Women who worked in the previous year fed their children on the lowest diverse diet.

The relationship between woman's work schedule in the year and child diet diversity score was assessed using a one way ANOVA test. The results showed statistically significant finding between women's work schedule groups and child diet diversity [F (2,383.148) =34.783, P<0.001]. The effect size of this association was found to be minor (eta squared =0.04) (Cohen's 1988), explaining only 4% of the variance in child dietary diversity score. The post hoc test of comparison results showed that dietary score of children whose mothers worked all year round (M-3.0, SD=1.5) was different from those whose mothers worked seasonally (M=2.4, SD=1.3) and the diet of children whose mother worked seasonally was also different from those whose mother worked occasionally (M=2.7, SD=1.5). The results suggest that mothers who worked all

year round provided a much more diverse diet to their children, and children whose mothers worked occasionally were fed on the lowest varied diet.

A one way ANOVA test was used to assess the association between types of earnings the women got from their work and child diet diversity score. The test revealed statistically significant between the women's earning categories and child diet diversity score [F (2, 92.947) =18.217, P<0.001]. The effect size of this relationship was found to be small (eta squared=0.03) (Cohen's 1988), as it explained 3% of the variance in child dietary diversity score. The post hoc test of comparisons using Turkey HSD showed that children whose mothers were not paid (M=2.4, SD+1.3) were fed differently from those whose mothers were paid cash only (M=2.9, SD=1.5). In additions, children whose mothers were paid cash only also fed their children differently from those that were paid cash and in kind (M=2.4, SD=1.4) and also in kind only (M=2.0, SD=1.8). The results show that women who were paid cash fed their children on more diverse diets than those that received any other kind of payment. Children of mothers who were paid in kind only were fed the lowest diverse diets.

The women's earnings relative to their partners or husband's earning was not associated with child dietary diversity score. Women who earned more than the partner or husband fed their children a mean dietary diversity score of 3.1 (SD=1.6) while those that had less than the partner or husband fed children a mean dietary score of 2.8 (SD=1.6). A one way ANOVA test showed that the differences between the relative earnings of the woman and husband groups and child dietary diversity were not statistically significant (P>0.05) suggesting that the feeding of the children did not vary with the relative earnings of the woman to the husband's or partners.

The employer of the women was found to have an association with child dietary diversity score. A one way ANOVA performed to examine the relationship between the woman's employer and child dietary diversity showed that statistically significant differences existed between child diet diversity score and

the categories of employers of the mother [F(2, 371.491)=13.162,P<0.001]. The effect size of this relationship was found to be small (eta squared = 0.019) (Cohen's 1988), as it explained only 2% of the variance in child dietary diversity score. The post hoc test performed to identify the different groups using Turkey HSD indicated differences in the child diet diversity score among children whose mothers worked for the family (M=2.6, SD=1.4) and someone else (M=3.2, SD=1.6), between mothers who worked for someone else and self-employed (M=2.5, SD=1.6) and between self-employed mothers and those that worked for someone else. This result shows that self-employed mothers fed a less varied diet to their children and children whose mothers worked for someone else were likely to be fed on a more varied diet.

The woman's place of work was found to have no effect on child diet diversity score. The results indicate that women who worked away from home fed their children an average score of 2.6 (SD=1.5) and those that worked in their homes fed their children an average score of 2.6 (SD=1.4). A samples t-test was used to examine the association between women's work distance from home and child dietary diversity. No statistically significant differences were found between women working away or in the home and child diet diversity score (P>0.05) indicating that the child diet diversity score did not differ by the mother's places of work.

Table 2a2: Women's characteristics and child diet diversity

	Status	N	Mean	Std. Deviation	Std. Error	Lower CI	Upper CI
Woman's educational attainment	No education	214	2.3	1.4	0.1	2.1	2.5
	Primary	1324	2.4	1.3	0.0	2.3	2.4
	Secondary	1325	2.7	1.5	0.0	2.6	2.8
	Higher	199	3.3	1.6	0.1	3.1	3.5
	Don't know	62	2.8	1.5	0.2	2.5	3.2
	Total	3124	2.6	1.4	0.0	2.5	2.6
Woman's type of work	not working	1342	2.5	1.4	0.0	2.4	2.6
	professional	118	3.6	1.7	0.2	3.3	3.9
	clerical and skills jobs	506	2.8	1.4	0.1	2.7	2.9
	agricultural	1097	2.4	1.3	0.0	2.3	2.5
	other unskilled	74	2.9	1.4	0.2	2.6	3.2
	Total	3136	2.6	1.4	0.0	2.5	2.6
Working status past year	In the past year	125	2.4	1.4	0.1	2.1	2.6
	Currently working	1627	2.6	1.4	0.0	2.6	2.7
	Have a job, but on leave last 7 days	42	3.1	1.7	0.3	2.6	3.6
	Total	3136	2.6	1.4	0.0	2.5	2.6
frequency of working	All year	583	3.0	1.5	0.1	2.9	3.1
	Seasonal	1081	2.4	1.3	0.0	2.3	2.5
	Occasional	128	2.7	1.5	0.1	2.5	3.0
	Total	1792	2.6	1.4	0.0	2.5	2.7
Types of earnings	Not paid	780	2.4	1.3	0.0	2.3	2.5
	Cash only	876	2.9	1.5	0.1	2.8	3.0
	Cash and in-kind	112	2.4	1.4	0.1	2.1	2.6
	In-kind only	23	2.0	1.8	0.4	1.3	2.8
	Total	1791	2.6	1.4	0.0	2.6	2.7
Who the woman works for	For family member	260	2.6	1.4	0.1	2.4	2.8
	For someone else	196	3.2	1.6	0.1	2.9	3.4
	Self-employed	1335	2.5	1.4	0.0	2.5	2.6
	Total	1791	2.6	1.4	0.0	2.5	2.7

Women's exposure to media

Reading of magazines among women was found to have an effect on child dietary diversity score. The results indicates that women who never read magazines at all fed their children an average score of and those that read once per week and everyday fed them at the score of 2.9 (SD=1.5) and 3.2(SD=1.1) respectively. A one way ANOVA was performed to assess the relationship between reading of magazines and child diet diversity score found statistically significant differences between the four groups of mother's magazine reading status and child diet diversity score [F (3,41.555)=25.284,P<0.001]. The measure of effect for this association was small (eta squared=0.029) explaining 3% of variance in child's diet diversity score. The post hoc test using Turkey HSD showed that child diet diversity score differed significantly for children whose mothers never read the magazine (2.4; SD=1.4), read the magazine once a week (2.8;SD=1.4), read at least once a week (3.1; SD=1.7) and those whose mothers read every day (3.2;SD=1.7). The results indicate that mothers who read magazines either at least once a week, less than once a week and everyday fed their children on a variety of foods than those whose mothers never read magazines at all.

Listening to radio among women was found to be associated with child dietary diversity score. A one way ANOVA was performed to examine the relationship between reading of magazines and child diet diversity score found statistically significant differences between the women's listening to radio categories and child diet diversity score [F (3,41.555)=25.284,P<0.001]. The effect size of the relationship was very minimal (eta squared =0.014) explaining only 2% of variance in child diet diversity. The post hoc test using the Turkey HSD showed differences in the diversity of children's diet between mothers who never listened to radio at all (M=2.4, SD=1.4) and those that listened to radio everyday (M=2.8, SD=1.5) and, between those whose mother listen to radio every day and those that listened less than once per week (M=2.4, SD=1.4). The results indicate that women who were exposed to radio on daily basis fed their children a diverse diet than those that never listened to radio or listened less than once per week.

Watching television among mothers was found to be associated with child dietary diversity score. A one way ANOVA performed to observe the relationship between groups of frequency of watching TV and child diet diversity score found statistically significant differences between women's listening to radio and child diet diversity score [F (3,412.071)=37.736,P<0.001]. The measure of effect size was slightly small (eta squared = 0.041) explaining on 4.1% of variance in child's diet diversity score. The post hoc test using the Turkey HSD showed differences in the diversity of children's diet between mothers who never watched TV at all (M=2.4, SD=1.3) and those that watched TV everyday (M=3.1, SD=1.6) and, between those children whose mother watched TV every day and those that watched less than once per week (M=2.6, SD=1.4) and between those that watched TV every day and those that watched at least once a week (M=2.6, SD=1.6) . Generally, children whose mothers watched TV everyday were fed on a much more varied diet than those that did not watch TV at all and those that watched less than once a week. Mothers who never watched TV fed their children the least varied diets.

Husband or Partners' characteristics and child diet diversity

The relationship between woman's husband or partner's education attainment and child diet diversity score was assessed using the one way ANOVA. The results indicate statistically significant differences between women's educational attainment groups and child diet diversity score [F (4,320.878) =21.866, P<0.001]. The measure of effect for this relationship was small (eta squared=0.034) (Cohen's 1988), this explains 3% of the child's dietary diversity. Differences in child diet diversity among the groups was explored using the post hoc test of comparison. The Turkey HSD test showed differences between the women's partners' who had no education (M=2.3, SD=1.4) and those that went up to secondary education (M=2.7, SD=1.5) and those that attained higher educations (M=3.3, SD=1.6). In addition, differences were observed between partners who attained primary education (M=2.4, SD=1.3) and those that went to secondary educations and higher. Further differences were shown between partners who attained secondary education and those that went to primary and

higher education. These result show that child diet diversity score improved with an increase in the mother's partners' educational attainment.

A one way ANOVA was performed to assess the relationship between husband's or Partner's jobs and child diet diversity score. The results showed statistically significant differences between child diversity score and the five categories of women's' partners job types [F (4,469.6677) =34.494, P<0.001]. The slight measure of effect for husband's or partners levels of education was found on child diet diversity (eta squared =0.03), explaining only 3% of the variance in child dietary diversity. The post hoc test comparisons indicated differences in child diet diversity for children whose mother's partners were not working(M=2.4, SD=1.3) and those whose mothers' partners worked in professional jobs (M=3.0,SD=1.6), between those whose mothers' partners worked in professional job and agricultural jobs (M=2.4, SD=1.3) and other unskilled jobs (M= 2.7, SD=1.5), between the clerical or other service jobs (M=2.8, SD=1.6) and agricultural and between agricultural and clerical or service jobs. The results suggest that mother's whose partners were in professional jobs were associated with feeding children on more diverse diets than any other type of jobs. Those whose partners or husbands were either not working or involved in agricultural activities were associated with lowest child diet diversity.

The woman's husband or partner's age was associated with child diet diversity. A Pearson product moment correlation coefficient found statistically significant positive correlation between child diet diversity score and husband's or partners age [r=.066, N=3136, p<0.001] suggesting that older husband's or partners were associated with children who were fed on diversified diet than younger ones (Appendix2b). The measure of effect for this relationship was however small (r^2= 0.0043) (Cohen 1988), explaining only 0.4% of child dietary diversity.

Child characteristics and child's diet diversity score

The child's sex was found to have no effect on child dietary diversity score. The results indicates that male children had an average dietary score of 2.5 (SD=1.5) and females had an average diet diversity score of 2.5(SD=1.4). An independent samples t-test was used to examine the association between gender of the child and child dietary diversity score showed no statistically significant differences (P>0.05) indicating that the child's diet diversity did not differ by gender of the child.

The breast feeding status of children was found to have an association with child dietary diversity score. Non breast fed children had an average diet diversity score of 3.2(SD=1.4) and breast fed children had an average score of 2.4(SD=1.4). An independent samples t-test used to examine the association between children's' breast feeding status and child dietary diversity score found statistically significant differences between child breast feeding status and child diet diversity score [t(3134) =11.801, P<0.001] indicating that breast fed children were likely to be fed on less variety of foods than non-breast fed children.

The mother's perception of the child's weight at birth was found to be associated with child dietary diversity score. A one way ANOVA performed to examine the association between the mothers' perceived birth size of the child and child's dietary diversity score found statistically significant differences between the six groups of mothers' perceived child's birth size and child diet diversity score [F (5,209.276) = 4.587, P<0.001) suggesting that children who were thought to be very small at birth were likely to be fed on less varied diet. The measure of association of this relationship was found to be very small (eta square = 0.007) (Cohen's 1988), explaining only 0.7% of child's dietary diversity score.

The child birth weight was found to have an association with child diet diversity score. Using the Pearson product moment correlation coefficient to examine the association between child's birth weight and child diet diversity score, statistically significant positive correlation was found between child diet diversity score and

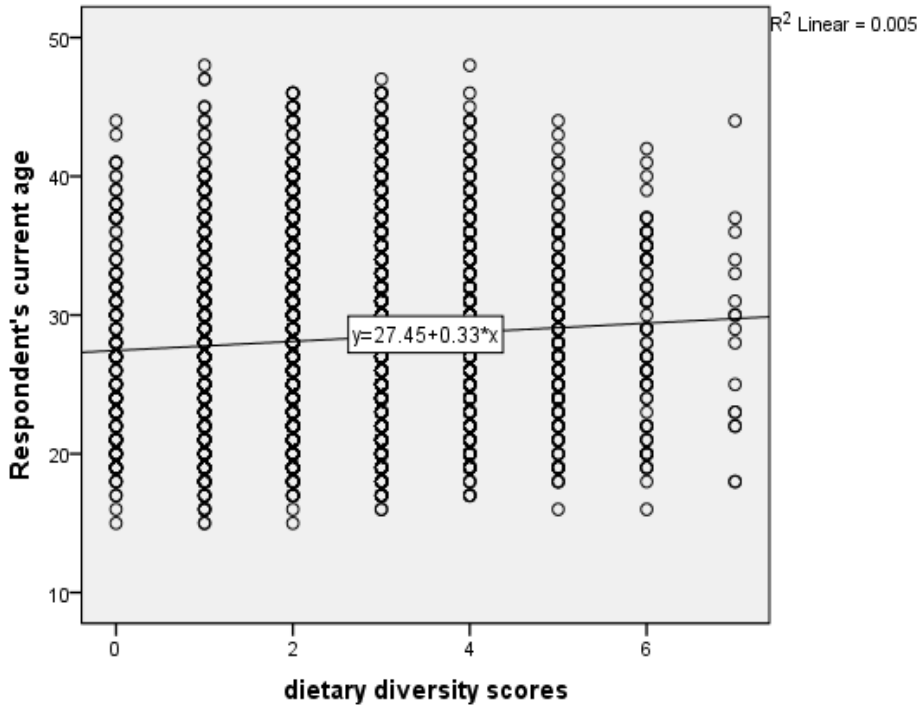
child's birth weight [r=.043, N=3136, p=0.043]. These results show that children who had a higher birth weight were likely to be fed on a diversified diet than those that were underweight or had low birth weight (Appendix 2b5). The effect size of this association was found to be small (r^2=0.0018) (Cohen 1988), which only explained explaining only 2% of variance of child dietary diversity.

The number of children under the age of five years old in the household was associated with child diet diversity score. A Pearson product moment correlation coefficient found statistically significant positive correlation between child diet diversity score and number of children in the households [r=.083, N=3136, p<0.001] suggesting that the child diet diversity increased with the number of children less than five years old in the household (Appendix2b2). The measure of effect for this relationship was however small (r^2= 0.007) (Cohen 1988), explaining only 0.7% of child dietary diversity score.

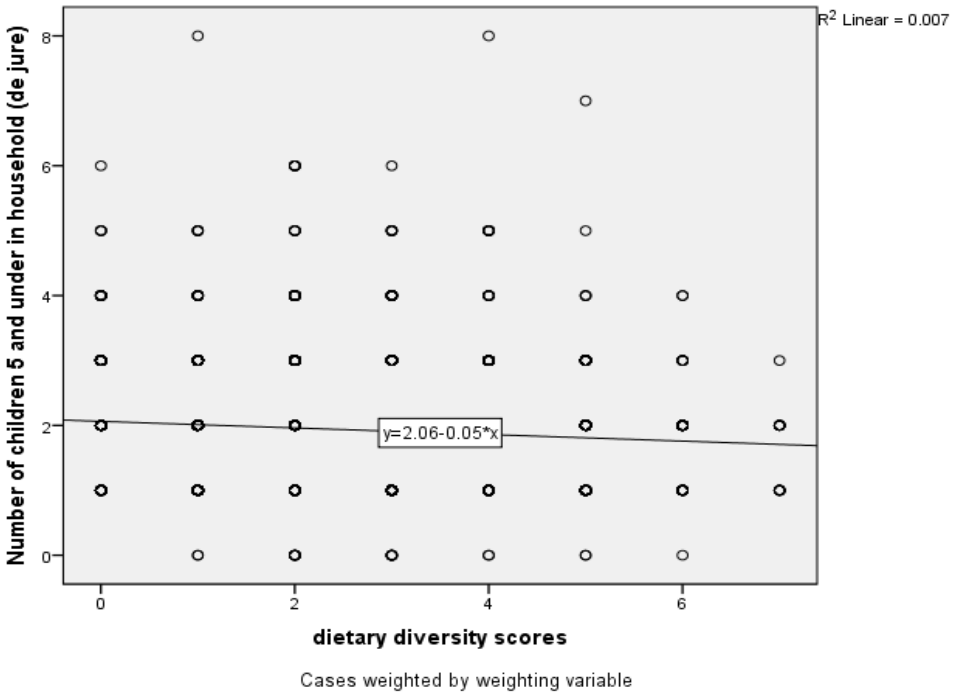
The child age was found to have an association with child diet diversity. A Pearson product moment correlation coefficient was used to examine the association between child's age and child diet diversity score, statistically significant positive correlation was found between child diet diversity score and child's age [r=.260, N=3136, p<0.001] suggesting that children's diet diversity score increased with the increase in the age of the children (Appendix 2b6). The measure of effect for this relationship was however small (r^2= 0.067) (Cohen 1988), explaining only 7% of child dietary diversity.

Appendix 3.1c1: Scatter Plots for the relationship between households, individual characteristics and child dietary diversity.

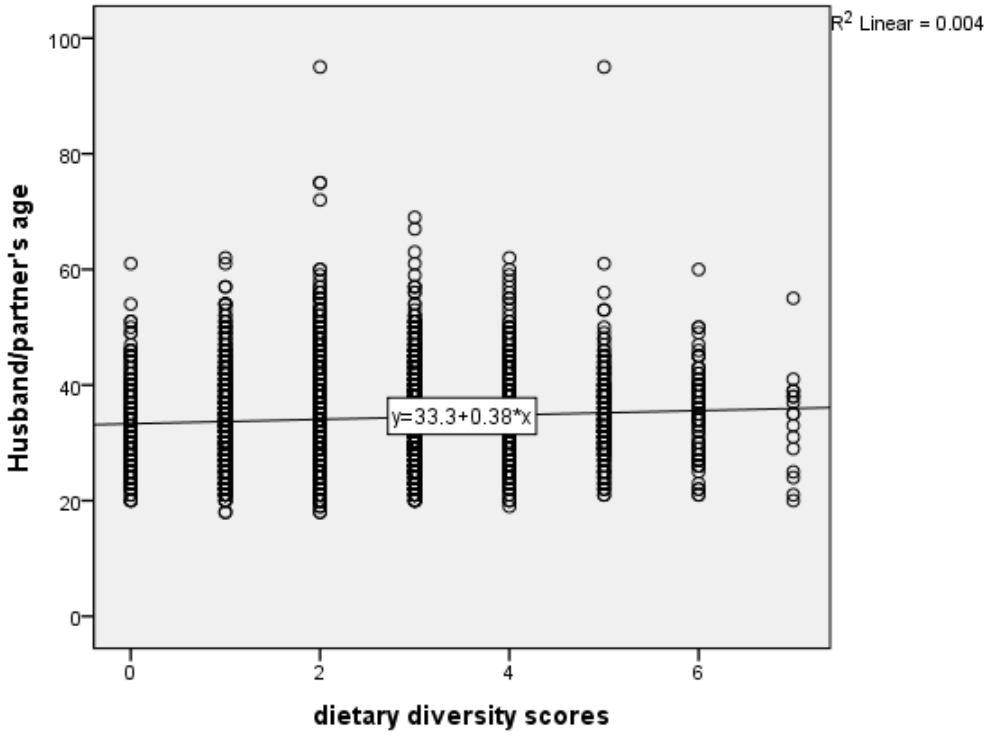
1. **Women' age and child dietary diversity**



2. **Number of children less than 5 years and Child diet diversity**

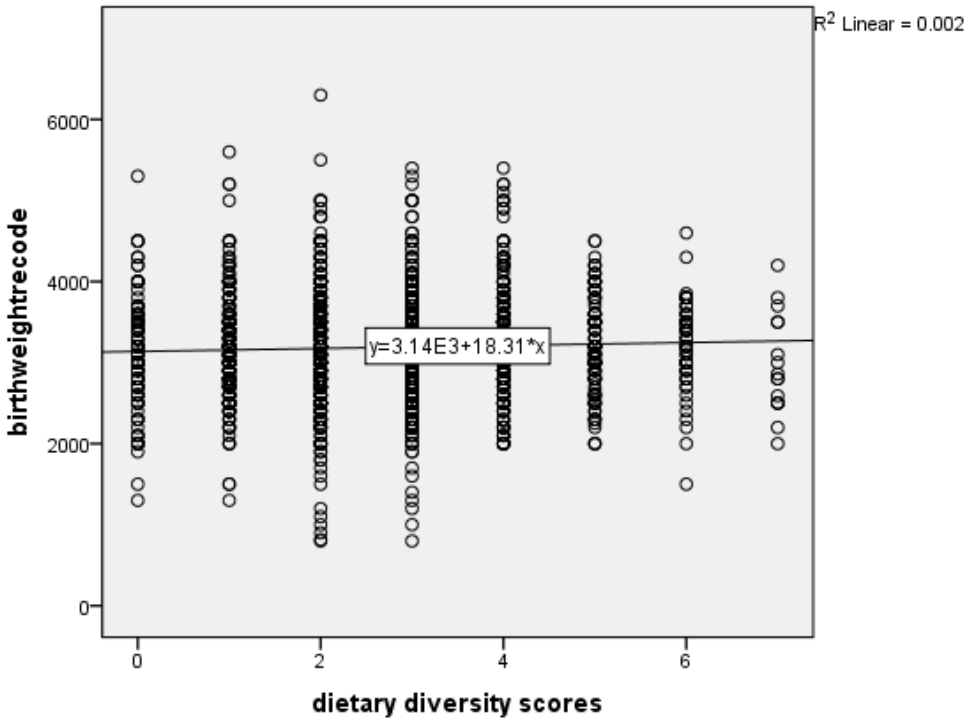


3. Husband's or partners age and child diet diversity



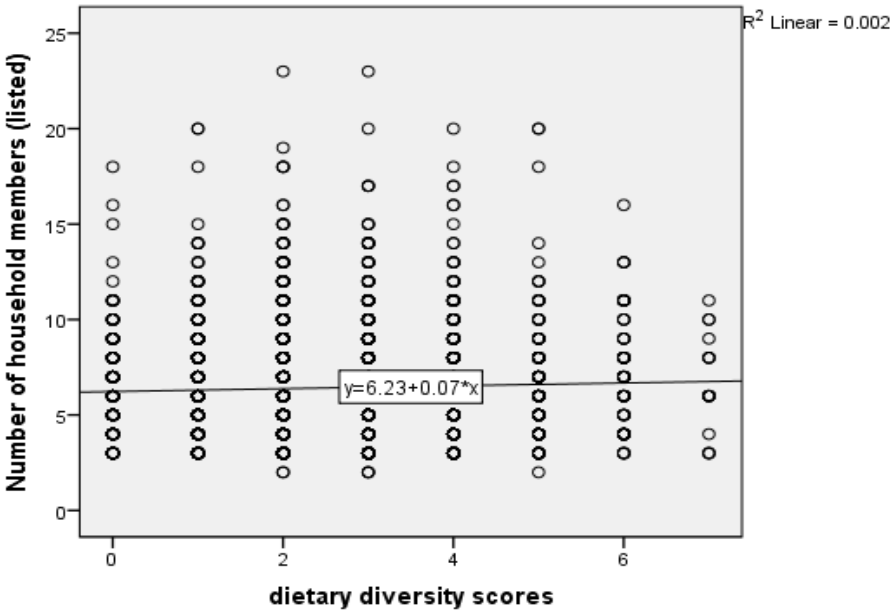
Cases weighted by weighting variable

4. Child's birth weight and child diet diversity



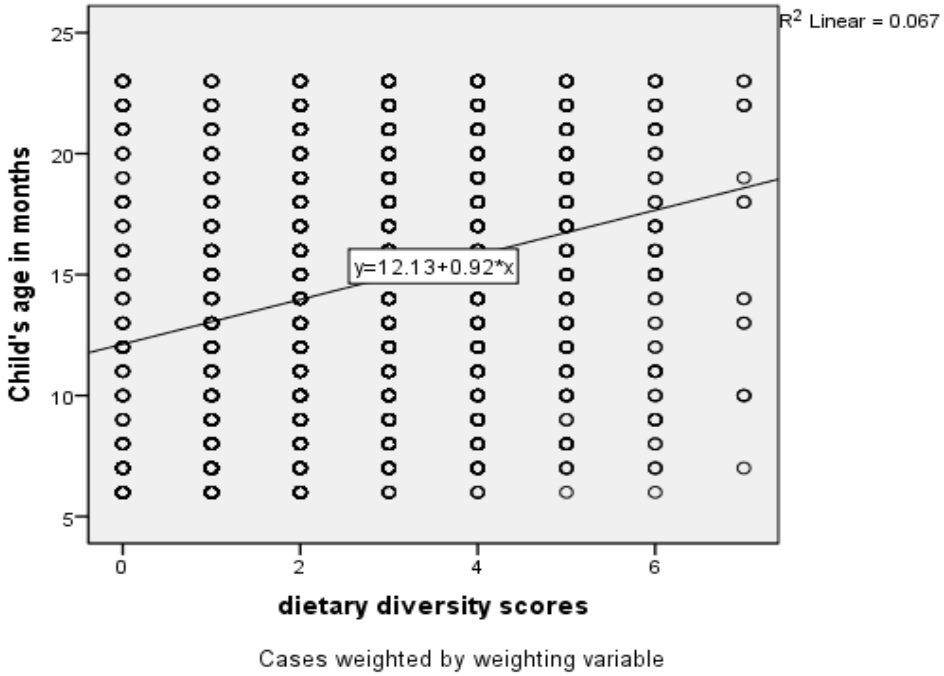
Cases weighted by weighting variable

5. Number of household members and child diet diversity

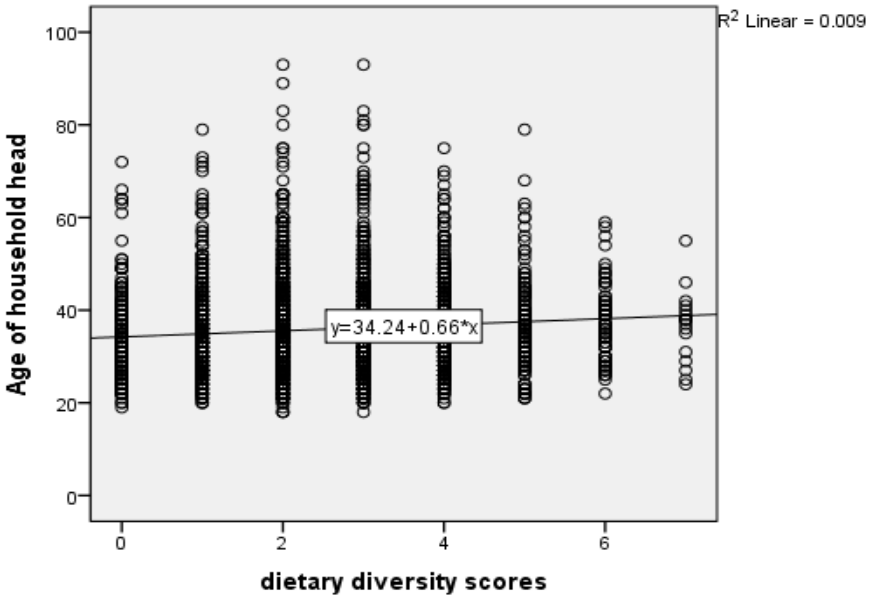


6.

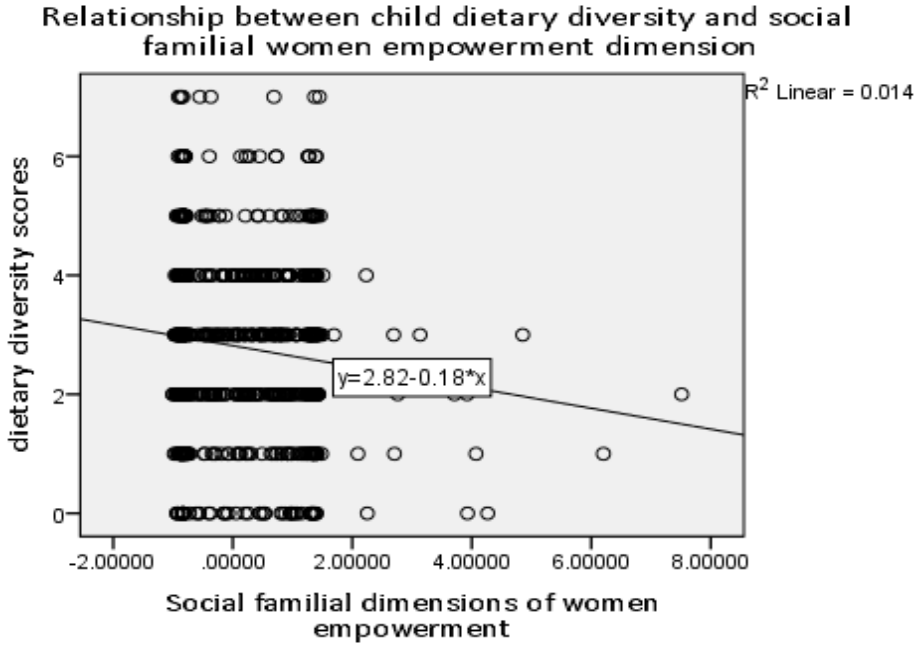
7. Child's age in months and child diet diversity

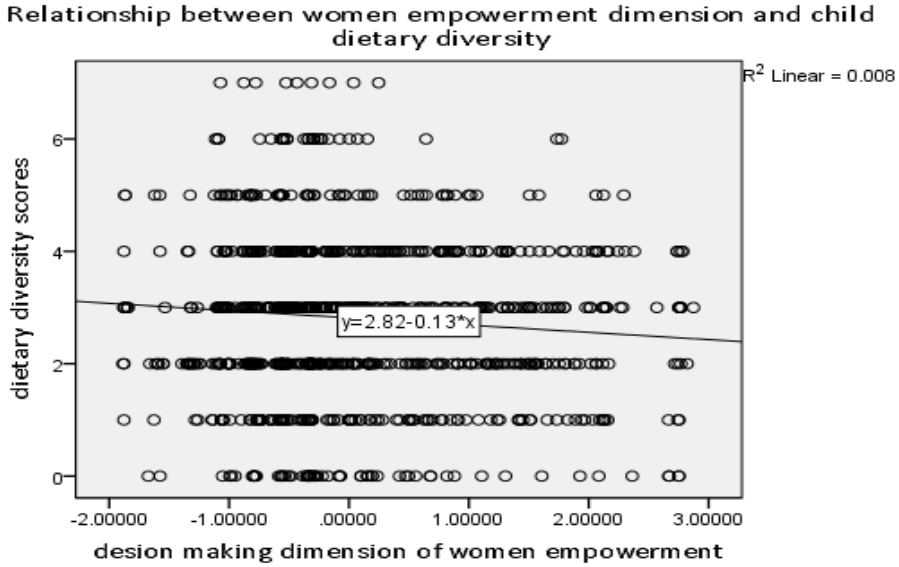


8. Age of the household head and child diet diversity



Appendix 4.1a: Scatter Plots for the relationship between women empowerment dimensions and child diet diversity.




Relationship between women empowerment dimension and child dietary diversity
R2 Linear = 0.008
dietary diversity scores
0
2
4
6
y=2.82-0.13*x
-2.00000
-1.00000
.00000
1.00000
2.00000
3.00000
desion making dimension of women empowerment

Appendix 4.1b: Diagnostics Plots for the regression between women empowerment and child diet diversity