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Complementary Infant Feeding Practices in Afghanistan

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Abstract

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by

Hasibullah Niayesh

MPH, Johns Hopkins University, 2009

MD, Shaikh Zahid University, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Children are at greater risk of malnutrition in Afghanistan than they are in many other countries. Malnutrition impairs the mental and physical growth of more than 50% of children in Afghanistan. It also exacerbates the risks of mortality by 45% in infants and children in Afghanistan. The purpose of this study was to determine the association between mothers' knowledge, attitudes, and practices regarding complementary feeding and malnutrition in children in Afghanistan. The precaution adoption process model served as a theoretical framework in this quantitative cross-sectional research study. Data analyzed were collected from 306 mothers and children at 6 randomly selected hospitals in Kabul Province. The results of logistic regression models indicated that mothers' knowledge, attitudes, and practices regarding complementary feeding were statistically significant predictors of stunting in children, $\chi2$ (9, $N = 306$) = 45.33, $p < .001$; $\chi2$ (9, $N = 306$) = 26.71, $p < .01$; and $\chi2$ (9, $N = 306$) = 56.97, $p < .001$ respectively. The strongest predictor was mothers' practicing responsive feeding, where mothers who did not practice responsive feeding were 7.1 times more likely to have stunted children than mothers who practiced responsive feeding. Moreover, the results indicated that mothers' knowledge, attitudes, and practices of complementary feeding were statistically significant predictors of underweight in children, $\chi2$ (9, $N = 306$) = 37.49, $p < .001$; $\chi2$ (9, $N = 306$) = 41.15, $p < .001$; and $\chi2$ (9, $N = 306$) = 44.64, $p < .001$. The implications for positive social change include reviewing nutrition policies, investing in nutrition programs, and operationalizing nutrition education and behavior change interventions for promoting appropriate complementary infant feeding practices in Afghanistan.

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Dedication

Every accomplishment requires commitment, hard work, and guidance of the mentors, family members, and friends. I extend my due respects to all my teachers and instructors whose long-lasting support and guidance have enabled me to earn the degree of doctor of philosophy in public health. I dedicated my efforts to my beloved wife, caring mother, and entire family whose love, affections, and support made it possible to accomplish the honor of becoming the doctor of philosophy in public health.

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Behind every successful man, there is a woman. My wife is a great source of motivation and support for me. I extend my acknowledgment and appreciations to my family members, especially my beloved wife whose support was instrumental in the process of accomplishing this honor. Without my wife's support, I would not have owned the title of doctor of philosophy in public health.

I would like to extend my sincere appreciations to the leadership and staff of the Ministry of Public Health in Afghanistan. Above all, I am grateful to my Almighty Allah, the lord of soul and wisdom, for his countless mercy and grace in my life.

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Chapter 1: Introduction to the Study

Introduction

Appropriate complementary food is essential for the optimal physical, mental, and behavioral development of infants and children (World Health Organization [WHO], 2005). The term *appropriate complementary feeding* is defined as follows:

> The process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of the infants, and therefore other foods and liquids are needed along with breastmilk. The transition from exclusive breastfeeding to family food is referred to as complementary feeding (Pan American Health Organization & World Health Organization [PAHO], 2002, pp. 8-9)

Complementary foods need to begin to be fed to all infants at the age of 6 months and continue until the age of 24 months to all children (WHO, 2016). The World Health Organization recognizes appropriate complementary feeding practices as a crucial public health intervention to ensure the optimal physical and mental development of infants and children. The WHO defines complementary feeding practices as the process of beginning complementary foods to all infants at the age of 6 months. The WHO also recommends that all infants and children need to be fed nutritionally diverse foods at different frequencies (PAHO & WHO, 2002). Moreover, complementary feeding practices include safe preparation of complementary foods by caregivers, consuming vitamins and minerals by infants and children, responsive feedings, and appropriate feeding practices during and after illnesses as per the WHO's guiding principles for complementary feeding of the breastfed child (PAHO & WHO, 2002).

Early childhood is a critical age for all infants and children to ensure the physical, mental, and behavioral growth of infants and children as well as prevent malnutrition and its irreversible consequences among children (WHO, 2016). Inappropriate complementary infant feeding practices result in aggravating the risks of malnutrition, morbidity, and mortality among infants and children. In the long term, malnutrition impairs the optimal physical, intellectual, and behavioral growth of children. In addition, inappropriate complementary feeding practices negatively affect the work performance capacity, productivity, and overall health status of children in adolescent age (PAHO & WHO, 2002). The United Nations International Children's Emergency Fund Office in Afghanistan reported that in 2012 over 50% of children aged younger than 5 years were malnourished in Afghanistan (United Nations International Children's Emergency Fund and Central Statistics Organization, 2012). Researchers found that after the age of 2 years, it is difficult to avert the negative consequences of malnutrition among children. The WHO (2006) strongly recommends promoting exclusive breastfeeding and complementary feeding practices to ensure physical, intellectual, and behavioral growths of children.

Several studies have been conducted to determine the patterns of exclusive infant breastfeeding practices among mothers in Afghanistan. However, no study has been conducted to determine the patterns of complementary infant feeding practices in Afghanistan. In addition, significant gaps in the literature exist in explaining complementary infant feeding practices in Afghanistan. My quantitative cross-sectional survey research study will be the first research study to determine the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in Afghanistan. My study will also guide the Afghan Ministry of Health and other stakeholders to address the gaps in nutrition policies, strategies, and programs to reduce malnutrition and morbidity and mortality associated with malnutrition among children in Afghanistan.

In this chapter, I describe the study background and problem statement, the research questions, the significance of the study, the research approach, the use of the theoretical framework, and analytical strategies I used to determine knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in Afghanistan.

Problem Statement

Malnutrition is a priority public health problem. One of the targets of the millennium development goals is to reduce the prevalence of malnutrition in children younger than 5 years in the poor and developing countries (UNICEF, 2006). According to the WHO (2016), approximately 156 million children are chronically malnourished worldwide. This accounts for 23% of all children stunted globally (WHO, 2016). Children in the Asian and African countries have the highest rates of malnutrition.

Approximately 60 million children are stunted in Africa, and 59 million children are stunted in Asia (WHO, 2016). In Asia, Afghanistan reported the highest rates of malnutrition among children. UNICEF and Central Statistics Organization (2012) reported that 55% of children younger than 5 years are experiencing chronic malnutrition and 17.8% of children younger than 5 years are experiencing acute malnutrition.

Malnutrition is considered a key determinant of morbidity and mortality among children in Afghanistan. It potentiates the risks of death by approximately 45% among children (WHO, 2016). Malnutrition also hinders the physical, mental, and intellectual abilities of children (Harison, 2014; King, 2013). In addition, the country inherits a stunted generation whose feeble and lame growth and development of children will have long-lasting social and economic effects in Afghanistan (Emily, Kees, Laviolette, & Mbuya, 2013). Children suffering from malnutrition are at higher risk of anemia, infectious diseases, and deaths. The latter increases the cost for families and health care systems.

Malnutrition also affects the performance of children at schools, increases the likelihood of repeating grades and drop-out rates among children, and increases the costs of the educational system. In adulthood, malnutrition affects the physical and intellectual capacity of individuals, as they turn out to be less productive. At the national level, malnutrition decreases gross domestic product rate by 10% (Office for the Coordination of Humanitarian Affairs, World Food Programme, and United Nations, and Economic Commission for Africa, 2012).

The term *complementary feeding* is defined as follows:

> The process starting when breast milk is no longer sufficient to meet the nutritional requirements of infants; therefore, other foods and liquids are needed, along with breast milk. The target range for complementary feeding is generally assumed to be 6 to 23 months (PAHO & WHO, 2002, pp. 8-9).

According to the WHO, providing adequate and diverse foods to meet the nutritional needs of infants and young children is critical for the optimal growth and development of the infants and young children. The period from birth to 24 months is known as the critical window for the physical, intellectual, and behavioral growth of infants and young children. Deficiencies in providing adequate foods and nutrients will delay the optimal growth of infants and children. After the age of 2 years, it is impossible to reverse the negative consequences of malnutrition resulting from inappropriate breastfeeding and complementary feeding practices among infants and young children. The immediate effects of poor nutrition due to inappropriate complementary infant feeding practices include increasing the rates of morbidity and mortality among children, as well as delaying the optimal physical and mental growth of children. In the long term, early infancy nutritional deficits due to inappropriate complementary feeding practices result in impairing intellectual, behavioral, working capacity and overall health during adulthood (PAHO & WHO, 2002). Therefore, appropriate complementary feeding practices during infancy play an effective role in preventing malnutrition rates and its negative consequences among children (Dirorimwe, 2008). Unfortunately, a significant gap exists in the literature regarding the level of knowledge, attitudes, and practices of mothers regarding complementary feeding practices in Afghanistan. In my study, I aimed to determine the level of knowledge, attitudes, and practices of mothers regarding complementary feeding practices for infant feeding in Afghanistan. Findings may guide informed policy and program decisions to reduce malnutrition rates among children in Afghanistan (Ministry of Public Health of Afghanistan, 2009).

Purpose

The purpose of this quantitative cross-sectional survey was to identify valid and reliable information on the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in Afghanistan. I measured the levels of knowledge, attitudes, and practices of mothers regarding complementary infant feeding to assist the Afghan Ministry of Health and its partners in planning effective nutrition interventions. There is a lack of reliable data on the levels of knowledge, attitudes, and practices of caregivers regarding complementary infant feeding in Afghanistan. Therefore, the findings of this quantitative study may be used to guide the Afghan Ministry of Health and other stakeholders to develop evidence-based nutrition policies and strategies in Afghanistan. Moreover, the Afghan Ministry of Health and other stakeholders may use the findings of this study to design health education materials to promote appropriate complementary feeding practices to reduce malnutrition rates among children in Afghanistan (Ministry of Public Health of Afghanistan, 2012).

Significance

Afghanistan accounts for the highest rates of acute and chronic malnutrition on the Asian continent. More than 50% of children are suffering from chronic malnutrition and 17.8% of children are suffering from acute malnutrition (UNICEF & CSO, 2012). The WHO declares malnutrition as a serious emergency situation if more than 10 % of children suffer from acute malnutrition in any country (WHO, 2000). The rates of malnutrition surpass the emergency situation in Afghanistan (UNICEF & CSO, 2012). Therefore, this important public health issue requires serious attention.

My study will play a significant role in addressing the gaps in the area of public nutrition, especially in promoting appropriate policies relating to complementary feeding practices for infant and young child feeding at the household and community levels, as well as to prevent the negative consequences of malnutrition due to nutrient deficiency in Afghanistan. My study will add to the body of literature that will help the Afghan Ministry of Health and stakeholders to address the gaps in nutrition policies and programs to reduce malnutrition rates and its complications among children in Afghanistan. My findings may also fill the policy and programs gaps in understanding complementary infant feeding practices at the household and community levels. In addition, I address the challenges and barriers that parents are facing to promote complementary infant feeding practices in Afghanistan (Batal, Boulghourjian, & Akkik, 2010).

I aimed to analyze the level of knowledge, attitudes, and practices of mothers on complementary feeding practices for infant and young child feeding in Afghanistan. Finally, my study is important because it is the first scientific research study that was conducted in Afghanistan to generate reliable and valid information on complementary feeding practices in the country. As a result, the Afghan Ministry of Health and other stakeholders may review their nutrition policies and strategies and design and implement evidence-based public health programs and interventions to reduce malnutrition rates and their complications among children in Afghanistan. Thus, my findings may promote positive social change in Afghanistan.

Theoretical Framework

I applied PAPM as an overarching theoretical framework to plan and implement this quantitative research study (Glanz, Rimer, & Lewis, 2008). I used the PAPM to assess knowledge, attitudes, and practices of mothers regarding complementary feeding practices to reduce malnutrition rates among children in Afghanistan. The PAPM is primarily a stage-based theory of behavior change that was discussed for the first time in 1988 (Glanz et al., 2008). The PAPM focuses on understanding the level of knowledge and attitudes of individuals to define the category and order of stages in which behavior change paradigms are practiced and assertions and precautions are taken place (Glanz et al., 2008). The PAPM is grounded around seven fundamental constructs starting from the stage in which there was an absolute lack of knowledge for adopting new precautions and actions to a stage in which people maintain the health actions or behaviors over time (Glanz et al., 2008). In Stage 1, the PAPM focuses on assessing whether the study participants are completely unaware of a health issue that affects their health. This is a stage in which the study participants may have never heard of the public health issues that they are facing. In Stage 2, the model focuses on assessing whether the research participants have ever learned about the health issue that they are facing and become aware of the health issue. In Stage 3, the model assesses the level of engagement and decision making of the study participants. The decision-making process will lead to the following: (a) The study participants may still have a suspended judgment to make decisions; (b) the study participants may adopt no precautions, moving to Stage 4 of the PAPM; or (c) they may adopt new behaviors and proceed to Stage 5 of the PAPAM

(Glanz et al., 2008). In stage five, the PAPM assesses whether the study participants determine to adopt healthy behaviors and precautions to prevent the negative consequences related to the problems that they are facing. In Stage 6, the model assesses whether the study participants initiate the adoption of the new behaviors and precautions (Glanz et al., 2008). Finally, in Stage 7, the model assesses whether the research participants are determined to maintain their behaviors with time (Glanz et al., 2008). Below is an illustration of the PAPM.

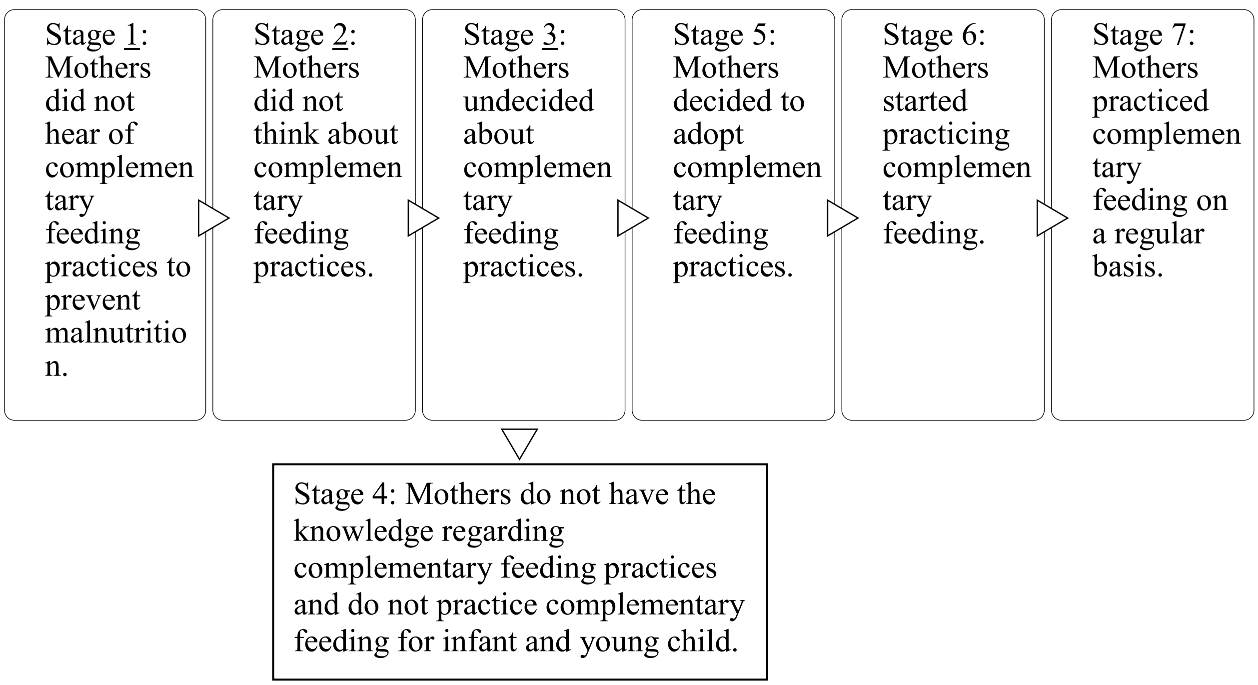

Figure 1. Precaution Adoption Process Model: Complementary Infant Feeding Practices.

In this research study, the PAPM provided an overarching platform to determine the level of knowledge, attitudes, and practices of caregivers from the earliest stages where mothers may not have any knowledge regarding complementary feeding practices to the stages in which mothers may get engaged to practice complementary feeding in Afghanistan (Glanz et al., 2008).

Research Questions and Hypotheses

Question 1: What is the association between mothers' knowledge about complementary feeding and malnutrition in children?

H_{01}: There is no association between mothers' knowledge about complementary feeding and malnutrition in children.

H_{a1}: There is an association between mothers' knowledge about complementary feeding and malnutrition in children.

Question 2: What is the association between mothers' attitudes about complementary feeding and malnutrition in children?

H_{02}: There is no association between mothers' attitudes about complementary feeding and malnutrition in children.

H_{a2}: There is an association between mothers' attitudes about complementary feeding and malnutrition in children.

Question 3: What is the association between mothers' practices of complementary feeding and malnutrition in children?

H_{03}: There is no association between mothers' practices of complementary feeding and malnutrition in children.

H_{a3}: There is an association between mothers' practices of complementary feeding and malnutrition in children.

Variables

Question 1 Independent Variable

The independent variable (IV) for Question 1 was defined as the level of knowledge of mothers on complementary infant feeding practices, which was defined as a binary variable having 2 categories, mothers not having knowledge of complementary feeding practices and mothers having knowledge of complementary feeding practices. The IV was coded as mothers having no knowledge (0) and mothers having knowledge (1).

Question 2 Independent Variable

The IV for Question 2 was defined as mothers expressing attitudes of complementary infant feeding practices positively or negatively. The IV variable was defined as a binary variable having 2 categories as mothers expressing attitudes of complementary infant feeding practices positively and mothers not expressing attitudes of complementary infant feeding practices positively. Mothers expressing the attitudes of complementary infant feeding practices positively given they consider complementary feeding practices important and demonstrate intentions to practice complementary infant feeding. On the contrary, mothers not expressing the attitudes of complementary infant feeding practices positively given they neither consider complementary feeding practices important nor demonstrate intentions to practice complementary infant feeding positively. The IV was as mothers not expressing attitudes (0) and mothers expressing attitudes (1).

Question 3 Independent Variable

The IV for Question 3 was defined as mothers practicing complementary infant feeding, which was defined as a binary variable having 2 categories, mothers not practicing complementary infant feeding and mothers practicing complementary infant feeding. The IV was coded as mothers not practicing complementary infant feeding (0) and mothers practicing complementary infant feeding (1).

Questions 1, 2, and 3 Dependent Variables

The dependent variables (DVs) in Questions 1, 2, and 3 were defined as the nutritional status of children aged between 6 to 24 months. The DVs were defined as binary (dichotomous) variables. The DVs were defined as children aged between 6 to 24 months who were malnourished and children aged between 6 to 24 months who were not malnourished. The DVs were coded as malnourished children (1) and not malnourished children= (0). The essence of continuous data for DVs included information on age, height, and the weight of the children aged between 6 to 24 months. In addition, the data on the upper mid-arm circumference (UMAC) of children aged between 6 to 24 months were collected. To determine the nutritional status of children, I measured the weight, height, and age of infants and young children meeting the inclusion criteria. I used the three indicators, namely weight for age, height for age, and weight for height to assess the nutritional status of infants and young children. Weight for age is an indicator to evaluate both acute and chronic malnutrition rates among children. According to UNICEF and CSO (2012), “Children whose weight for age is more than 2 standard deviations below the reference population are considered to be moderately or severely underweight” (p.

25). Height for age is an indicator to evaluate stunting (chronic malnutrition) among children. According to UNICEF and CSO (2012), “Children whose height for age is more than 2 standard deviations below the reference population is considered to be moderately or severely stunted” (p. 25). Weight for height is an indicator to evaluate acute malnutrition rate among children. According to UNICEF and CSO (2012), “Children whose weight for height is more than 2 standard deviations below the reference population are classified as moderately or severely wasted” (p. 25). I used the WHO’s growth standards as the reference population in this study. All three indicators are presented in standard deviation (*z* score) units from the median of the WHO’s reference population (UNICEF & CSO, 2012). Age of the children was from the vaccination card of the children and was confirmed by their mothers. The weight of the children was measured using a taring scale, and height of children was measured using height/length board. If a child age was younger than 2 years, his/her height was measured in recumbent using length board. If the age of a child was 2 years, her/his height was measured in standing position using height board. Standing height is 0.7 cm less than the recumbent length that will be considered during measurement of children height (UNICEF & CSO, 2012).

I used multiple logistic regression modeling to analyze the quantitative data in this cross-sectional research study given the binary nature of the outcome variables.

Nature of the Study

Nature this study of complementary feeding practices was a quantitative cross-sectional survey research study. I used a quantitative cross-sectional survey design to determine the level of knowledge, attitudes, and practices of mothers regarding complementary feeding practices for infants and young children in Afghanistan (Frankfort & Nachmias, 2008). In addition, I used the PAPM constructs to assess the level of awareness, engagement, and decision making of mothers regarding complementary infant feeding practices in Afghanistan (Frankfort & Nachmias, 2008). I applied a simple random sampling and systematic random sampling strategies to select the study participants in this cross.

In the first stage, I used a random sampling strategy to select a hospital(s) from the list that included the name of all public hospitals operating in Kabul Province. In the second stage, I applied a systematic random sampling strategy to select the study participants within the selected hospitals. The study participants were the mothers who had a child aged between 6 to 24 months (Frankfort & Nachmias, 2008). I used Gpower software to calculate the sample size for this study. To select a representative sample, the alpha level was be set at 0.05, the power was set at 0.8, and the effect size was at 0.5 (Erdfelder, Faul, & Buchner, 1996).

I applied a quantitative cross-sectional survey design to test the study questions and hypotheses (Creswell, 2013). I developed standard survey instruments to measure the study variables. The content, construct, criterion, and face validity of survey instruments were complied with and tested prior to starting data collection. A representative sample was selected to ensure the external reliability of the findings of this KAP survey (Creswell, 2013). I selected a quantitative cross-sectional research design because it is one of the widely applied research designs in the field of social science. A cross-sectional design is an appropriate choice to address the problem statement and research questions in this study. Using the cross-sectional research design allowed me to analyze, compare, and contrast multiple variables without manipulating the natural research setting. Meanwhile, I was able to analyze descriptive and inferential statistics to assist the Afghan Ministry of Health in planning appropriate nutrition and health education programs to reduce malnutrition in Afghanistan (Frankfort & Nachmias, 2008).

Possible Source and Types of Data

To determine the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in Afghanistan, I collected quantitative data from the study participants (mothers) who had a child aged between 6 to 24 months through conducting face-to-face interviews in health care settings in Kabul Province in Afghanistan. To address the problem statement and research questions in this research study, I collected quantitative data regarding the household characteristics of the study participants, age of the study participants, the level of education of the study participants, number of households and children, the place of delivery for the child aged between 6 to 24 months, economic status of the study participants, and anthropometric data (weight and height) of mothers and children aged between 6 to 24 months. I collected quantitative data to assess the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding in accordance with the WHO’s guiding principles for complementary feeding of the breastfed child guideline (PAHO & WHO, 2001). I also collected quantitative data to assess the level and stage of awareness, engagement, and decision making of mothers regarding complementary infant feeding practices using the PAPM (Glanz et al., 2008).

I used the PAPM will provide a solid framework to plan, design, and implement this cross-section research study and collect valid and reliable data to guide the policy and program staff in the Afghan Ministry of Public Health to make informed decisions for revising nutrition policies and strategies in Afghanistan (Frankfort & Nachmias, 2008). In addition to collecting data from the study participants, a systematic review of scholarly articles and documents published regarding complementary feeding practices in the international arena was conducted. The WHO's guideline for complementary feeding of the breastfed child was reviewed and utilized as a guide to complying with the standard data collection and operating procedures in this study (PAHO & WHO, 2001). In this study, the key IVs and DVs were defined as follows:

The key IV for Question 1was defined as the level of knowledge of mothers on complementary infant feeding practices which will be defined as a binary variable having 2 categories, mothers not having knowledge of complementary feeding practices and mothers having knowledge of complementary feeding practices. The key IVs were coded as mothers having no knowledge (0) and mothers having knowledge (1). The key IV for Question 2 was defined as mothers expressing attitudes of complementary infant feeding practices positive which will be defined as a binary variable having 2 categories, mothers not expressing attitudes of complementary infant feeding practices and mothers expressing attitudes of complementary infant feeding practices. The key IV was coded as mothers not expressing attitudes (0) and mothers expressing attitudes (1). The key IV for

Question 3 was defined as mothers practicing complementary infant feeding, which was defined as a binary variable having 2 categories, mothers not practicing complementary infant feeding and mothers practicing complementary infant feeding. The key IV was coded as mothers not practicing complementary infant feeding (0) and mothers practicing complementary infant feeding (1).

The key DVs in Questions 1, 2, and 3 were defined as the nutritional status of children aged between 6 to 24 months. The key DVs were defined as binary (dichotomous) variables. The key DVs were defined as children aged between 6 to 24 months who were malnourished and children who were not malnourished. The key DVs were coded as malnourished children (1) and not malnourished children (0).

The potential covariates in this study were the level of education of mothers and the economic status of mothers. I applied a quantitative cross-sectional survey design to collect the data from the study participants. I used a mix of cluster sampling and systematic random sampling procedures to select my study participants in this quantitative cross-sectional research study.

Applying a two-stage model, I used a cluster random sampling technique for the selection of the public hospitals operating in Kabul Province, followed by the systematic random sampling of study participants to ensure that heterogeneous groups of study participants were included in my research study (Stat Trek, 2016). More specifically, first, I divided all public hospitals operating in Kabul Province into five separate groups (clusters) of hospitals by geography, located in the north, south, east, west, and central zones in Kabul Province. After dividing all hospitals into five different clusters (groups) given their geographic locations, I randomly selected 6 hospitals, one hospital from each of the four zones and 2 hospitals from the central zone in Kabul Province. I randomly selected 2 public hospitals in the Central Zone because of population density in the Central Zone in Kabul Province. After randomly selecting 6 hospitals in these five zones in Kabul Province, I used the systematic random sampling procedures to select my study participants within each randomly selected public hospitals operating in Kabul Province (Stat Trek, 2016).

In this quantitative cross-sectional survey, the study participants were the women who had children aged between 6 to 24 months. Therefore, I collected data from the women and their children aged 6 to 24 who were present in the randomly selected hospitals in Kabul Province. The data were collected through conducting face-to-face interviews with each study participant in the hospital settings in Kabul Province. I collected data on the sociodemographic status of the study participants including the family size of the study participants, the level of education of study participants (mothers), and the level of income of study participants, age, weight, and height of the mothers who had a child aged 6 to 24 months. Moreover, data were collected on the gender, age, weight, height, MUAC, and a place of delivery of the child aged 6 to 24 months. The SPSS software was used to analyze the data. Data analysis strategies included using descriptive and inferential analyses. More specifically, I used logistic regression to analyze the data of this quantitative cross-sectional study.

Possible Analytical Strategies

I applied twofold analytical strategies to present the findings of my research study: (1) applying descriptive statistical strategies to analyze the DVs and IVs of the study and present the results in the paradigm of descriptive statistics; and (2) Inferential (analytical) statistical strategies to analyze the study variables and present the results in the paradigm of inferential statistics (Creswell, 2013).

Quality Control Measures

Applying quality control measures was the key strategy to prevent selection bias, information bias, and the effects of extraneous factors on the results of this survey research study. Quality control procedures were defined and implemented throughout the planning, designing, data collection, data processing, data analyses, and interpretation of results of this quantitative study (Roe, 2013). Quality control and standard operating procedures (SOPs) were developed and implemented throughout all stages of this research study. As an integral part of quality control measure, on the spot and post spot quality control measures were implemented to avoid different types of errors influencing the results of this research study (Roe, 2013).

Definitions

Knowledge

The term *knowledge* is defined as “the set of facts, information, and ideas that acquired by a person” (UNICEF, 2014, pp. 11-14). In this survey research study, the term *knowledge* is referred to the facts, information, and conditions that are possessed by the study participants with regard to the topic of complementary infant feeding in Afghanistan (UNICEF, 2014).

Attitude

The term *attitude* is defined as “ways of thinking or feeling about something or someone and are not always observable"(UNICEF, 2014, pp. 11-14). In this survey research study, the concept of attitudes refers to the belief, feeling, and behaviors of the study participants who might express regarding complementary infant feeding practices in Afghanistan (UNICEF, 2014).

Practice

The term *practice* is defined as “the observable behaviors, habits or skills, often performed without a conscious decision and in response to something in the environment or to knowledge or attitudes” (UNICEF, 2014, pp. 11 - 14). In this survey research study, the term *practice* refers to the observable use of knowledge and attitudes that result in performing complementary infant feeding practices among mothers who have children aged between 6 to 24 months. The term *practice* is also referred to the paradigm of processes in which the study participants are likely to exercise their knowledge and attitudes to practice complementary infant feeding (UNICEF, 2014). In this survey research study, the triad of knowledge, attitude, and practice constitutes the hierarchical structure to understand the patterns of complementary infant feeding practices among mothers in Afghanistan (UNICEF, 2014).

Malnutrition

The term *malnutrition* encompasses both undernutrition and overnutrition (UNICEF, 2006). According to UNICEF (2006) "people are malnourished if their diets do not provide adequate calories and protein for their growth, or they are unable to fully utilize the foods that they eat due to illnesses. People are also considered malnourished if they consume too many calories" (para. 1).

Exclusive Breastfeeding

The WHO defines *exclusive breastfeeding* as "an unequaled way of providing ideal foods for the healthy growth and development of infants" (WHO, 2016, para. 1). The practice of *exclusive breastfeeding* is considered as a critical public health intervention to promote the physical, mental, and intellectual growth of infants. The WHO recommends that infants must be exclusively breastfed during the first 2 quarters of their infancy and continued until 2 years and beyond (WHO, 2016).

Weaning

The term *weaning* is referred to the process in which the breast milk is completely stopped and the infants are transitioned from breastfeeding to the semi-solid and solid foods (Footeand Marriote, 2003).

The Concept of Appropriate Complementary Feeding

According to the WHO (2016), the term *complementary feeding* is defined as "the process of starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants and the transition from exclusive breastfeeding to family foods – referred to as complementary feeding" (para. 1). Complementary foods must be introduced for the infants at the age of 6 months and continued until the age of 24 months and beyond. This period is referred as a critical window where infants are at the higher risks of developing malnutrition (WHO, 2016).

Responsive Feeding

The concept of *responsive feeding* refers to applying the following principles of psychosocial care:

1) Infants and young children should be fed directly or/and assisted during feeding, and mothers need to be sensitive to the hunger cues of their infants and their satiety cues that the infants and young children may demonstrate (WHO, 2001).
2) Mothers need to feed their infants slowly and patiently. Mothers should encourage their infants and young children to eat but do not force them to eat (WHO, 2001).
3) If children tend to refuse eating foods, mothers need to experiment a combination of different foods including taste, textures, and methods of encouragement (WHO, 2001).
4) Mothers should minimize distractions while feeding infants and young children, mothers should keep eye contact with infants and talk to them while feeding them (WHO, 2001).

The Concept of Safe Preparation and Storage of Complementary Foods

The principles of *safe preparation and storage of complementary foods* are described as the process of washing children and caregivers hand's prior to food preparation and serving, serving food immediately after preparation as well as safely storing foods, using clean utensils while preparing and serving meals, and avoiding the use of feeding bottles (WHO, 2001).

Amount of Complementary Food

Complementary foods should be started at the age of 6 months with the small amounts of foods and the quantity should be increased in accordance to the needs of the infants and young children as they grow up older. At the same time, mothers should continue frequent breastfeeding (WHO, 2001). The WHO recommends that the energy needs from complementary foods with an average breastmilk intake for infants and young children in developing countries are approximately 200 kcal per day at 6-8 months of age, 300 kcal per day at 9-11 months of age, and 550 kcal per day at 12-23 months of age (WHO, 2001). However, in developed countries, these estimates are different (130, 310 and 580 kcal/d at 6 - 8, 9 -11, and 12 - 23 months, respectively (WHO, 2001).

Food Consistency

The WHO recommends that mothers need to increase the patterns of food variety and consistency in accordance with the infant's growths and energy requirements. The WHO also recommends that infants should be offered semi-solid foods, mashed foods, vegetables, and fruits at the age of 6 months (WHO, 2001). At the age of 8 months, mothers should give finger foods to their infants (WHO, 2001). The concept of finger foods refers to snacks which are only given to infants (WHO, 2001). At the age of 12 months, mothers should feed their infants with the same type of foods which are consumed by other family members (WHO, 2001).

Meal Frequency and Energy Density

The WHO recommends that the frequency of complementary foods should be increased as the infants are growing older (WHO, 2001). The frequency of feeding accounts for types and amounts of local foods consumed each time by the infants and young children. The frequency of complementary foods also depends on the energy density of locally available foods that families are consuming (WHO, 2001). The WHO recommends that a healthy infant at the age of 6 to 8 months needs to be fed between 2 to 3 times a day (WHO, 2001). At the age of 9 to 11 months, infants need to be fed 3 to 4 times a day. At the age of 12 to 24 months, young children should be fed with additional snacks (fruits, bread, nuts) 1 to 2 times a day. If children are not breastfed, it is recommended that more frequent meals should be offered to young infants given their energy requirements (WHO, 2001).

Nutrition Content of Complementary Food

The WHO recommends that infants and young children need to consume different varieties of foods to make sure that their nutritional requirements are fulfilled (WHO, 2001). Meals such as fish, meat, eggs, vegetables, fruits, and foods containing adequate fat should be offered daily to infants and young children. Mothers need to avoid feeding their infants the low energy density drinks such as tea, coffee, and sugary drinks because low energy density drinks replace more nutrient-rich foods (WHO, 2001).

Using Vitamin-Mineral Supplements for Infants

The WHO recommends that vitamin-mineral supplements and fortified products need to be consumed by the infants, pregnant, and lactating women. Consuming vitamin-mineral supplements and fortified products are required to meet the essential daily needs of infants, pregnant, and lactating women in most of the poor and developing countries (WHO, 2001).

Assumptions

Given the insecure context of Afghanistan, deteriorating security situation may impede the process of data collection. However, if the international troops do not withdraw from Afghanistan, the security may not deteriorate to impede the data collection process. The likelihood of withdrawing the international troops from Afghanistan is rare. The second assumption is obtaining the Institutional Review Board (IRB) approval from the Afghan Ministry of Health. The process of obtaining IRB's approval is tedious and time-consuming because governmental procedures are very lengthy and bureaucratic in Afghanistan (Ministry of Public Health of Afghanistan, 2012).

The assumptions are necessary to be met in the context of this study because the data collection had taken place in Afghanistan and the security was deteriorated in 2017 as compared to previous years in Afghanistan. In addition, without obtaining the IRB approval from the Afghan Ministry of Health, I could not collect data from my study participant in Afghanistan (Ministry of Public Health of Afghanistan, 2012).

Scope and Delimitations

Threats to validity are classified as threats to internal validity and threats to external validity. The concept of *threats to internal validity* is defined as the extent to which the alterations in the dependent (outcome) variables are correlated with the independent (explanatory) variables rather than extraneous factors. Internal validity deals with the study setup and selection of the study participants (Campbell & Stanley, 1963).

The term *internal validity* includes history, maturation, testing, instrumentation, statistical regression, experimental mortality, and interactions of selection and maturation (Campbell & Stanley, 1963). The term *history* refers to the occurrence of external events in addition to the independent variables between the first and second measurements in research studies. *History* was not a potential threat in this research study because the data collection interventions were completed at one point in time. *History* poses threats to internal validity in longitudinal studies and research studies with repeated measurements (Campbell & Stanley, 1963). Maturation is another threat to internal validity (Campbell & Stanley, 1963). The term *maturation* refers to a process within which the alterations may occur in the study participants due to the passage of time rather than the independent variables. Maturation is not a potential threat in this cross-sectional survey research because the data collection process was completed in a relatively shorter period of time (Campbell & Stanley, 1963). Testing is a threat to internal validity when the same group of study participants undergo the pre-test and post-test interventions and the results of the study are being influenced in a way that the study participants respond to the post-testing interventions. Testing is a potential threat in the research studies with repeated measurements and studies involved pre and posttest interventions. Testing was not a potential threat in this study (Campbell & Stanley, 1963).

Instrumentation is a potential threat to internal validity when changes may occur in the study instruments in certain ways that the questions are scored or information are gathered in the research instruments from the study participants. Instrumentation is a threat to internal validity in research studies when physiological instruments which are used for the data collection purposes are subjected to defects or changes. In this research study, I used height boards and scales to measure the height and weight of the infants and young children. I made sure that the instrumentation process does not pose any threat to internal validity in this survey research study (Campbell & Stanley, 1963). Quality control measures were in place to avoid threats to internal validity due to instrumentation. In addition, prior to starting data collection, the intra-rater and inter-rater reliability test measures were conducted to avoid threats to internal validity due to instrumentation (Campbell & Stanley, 1963).

Statistical regression is potential threats to internal validity when the study participants are chosen on the basis of extreme scores or criteria. A statistical regression is a potential threat to internal validity in studies where the researchers are using a convenience sampling strategy. In this research survey study, statistical regression was not any potential threat to internal validity because of applying the principles of randomization (Campbell & Stanley, 1963). Experimental mortality is a threat to internal validity when there is a high dropout rate or loss to follow-up among the study participants (Campbell & Stanley, 1963). Experimental mortality was not a threat to internal validity in this research study because data collection was completed at a single point in time (Campbell & Stanley, 1963). Experimental mortality is a threat to internal validity in longitudinal studies (Campbell & Stanley, 1963). The differential selection is a threat to internal validity when the respondents in the control groups are different in their characteristics from the respondents in the intervention groups. It was not a threat to internal validity in this study because there was one group of study participants who was selected based on using the principles of randomization (Campbell & Stanley, 1963). Selection-maturation interactions are threats to internal validity when the changes in the outcome variables are due to the extraneous factors or confounding variables. It is a threat to internal validity in quasi-experimental or study designs with multiple study groups (Campbell & Stanley, 1963). The selection-maturation interactions were not any threats to internal validity in this cross-sectional study designs because the study has one group of study participants (Campbell & Stanley, 1963).

The term *external validity* is defined as the approximation of truth of the study results that can be generalized (Trochim, 2006). Researchers believe that the concept of generalizability cannot be fully achieved (Campbell & Stanley, 1963). However, generalizability can be improved by selecting a large sample size that resulted in study participants demonstrating generalizability at the population levels in term of specific characteristics such as age groups, gender orientation, education status, socioeconomic status, and the truth of the study results (Campbell & Stanley, 1963). Some potential threats to external validity include testing reactivity, the interaction effects of selection and outcome variables, and reactive effects of experimental arrangements and multiple treatments. The term *threats to testing reactivity* refer to the fact that how the responses of study participants are influenced while they participate in the study (Campbell & Stanley, 1963).

This survey research is an observational study and was conducted within the natural setting. Therefore, testing reactivity was not a potential threat to affect the external validity of this research study (Campbell & Stanley, 1963). The interaction effects of selection and outcome variables are potential threats to external validity when nonprobability sampling strategy is applied. I applied the principles of randomization while selecting my study participants. Therefore, the interaction effects of selection were not the potential threats (Campbell & Stanley, 1963). The interactions of experiment/treatment and selections of the study participants were not considered the potential threats to affect the external validity in my study because it is a potential threat to external validity when convenience sampling procedures are applied to select the study participants in research studies. The process of randomly selecting my study participants has ruled out the threat to external validity in my study (Campbell & Stanley, 1963).

The interactions of intervention/experiment and research settings were not the potential threats to external validity because the study participants were diverse and belonged to different populations in the research settings in this research study (Campbell & Stanley, 1963). The interactions of experiment/intervention and history were a threat to external validity in this study because it is a cross-sectional research study that was conducted at a single point in time (Campbell & Stanley, 1963). Multiple treatments/intervention interactions are threats to external validity when interventions or treatments are applied to the same research participants. Multiple-treatment interference was not posing threats to external validity in cross-sectional study designs (Campbell, & Stanley, 1963). The study findings are generalizable because the study participants were selected based on using a mix of random sampling and systematic random sampling strategies in the hospital settings in Kabul Province. In the first stage, I randomly selected 6 public health hospitals based on using a random sampling strategy followed by applying a systematic random sampling strategy to have selected my study participants. This way the findings of this study approximated to be generalizable.

Challenges and Limitations

One of the limitations of this study is the fact that it cannot prove causal associations between independent and dependent variables. There were no major threats to internal validity and external validity in this research study. Quality control measures were in place to control internal validity and external validity (Campbell & Stanley, 1963).

In this study, there will be no threat to construct validity because the PAPM constructs are widely applied in other studies. In addition, the constructs were translated into measurable variables. The *threats to conclusion validity* are referred to the situations or factors that are likely to guide the researchers to reach incorrect conclusions in their research studies (Trochim, 2006). The threats to conclusion validity were avoided by controlling the effects of confounding factors and extraneous variables in this research study (Trochim, 2006). Quality control measures were applied in the stages of design, implementation, and data analyses. Moreover, using the principle of randomization has controlled the threats to conclusion validity in this survey research study (Trochim, 2006).

Confounding variables were adjusted during data analysis. The biases that may influence the results of this cross-sectional study include information bias and selection bias. Information bias was addressed by conducting the interviews with the study participants deliberately and cautiously and missing data were verified prior to completing the interviews with each study participants. Selection bias was addressed by selecting the study participants using the principle of randomization in this study (Campbell & Stanley, 1963).

Discussing the challenges in the field of research, the major challenge in planning and conducting research studies in Afghanistan is the threats of widespread insecurity that public health professionals are facing. Obtaining the IRB approval from the Afghan Ministry of Health was considered another challenge given its bureaucratic procedures. To avoid the challenge of insecurity, I planned to draw my sample in Kabul province, the capital of Afghanistan which is relatively safe as compared to other provinces.

Summary

Malnutrition prevention is one of the most important global public health issues. It inflicts the health of about 156 million children. Children in the Asian and African continents experience the highest rates of malnutrition. In Afghanistan, over 50% of children are chronically malnourished. Malnutrition aggravates the risks of mortality about 45% in children. To prevent malnutrition, it is important to promote exclusive breastfeeding and appropriate complementary infant feeding practices. Exclusive breastfeeding is recommended to be practiced by mothers from the birth to 6 months of age. At the age of 6 months, the WHO recommends the introduction of complementary foods for infants. Complementary feeding is a process where breast milk is no longer meeting the nutritional needs of infants; therefore, it is recommended to begin complementary foods at the age of 6 months to all infants to optimize the growth of infants and young children. This quantitative cross-sectional study aimed to determine the association between mothers' knowledge, attitudes, and practices regarding complementary infant feeding and malnutrition in children in Afghanistan. This cross-sectional survey research study adds to the body of literature to assist the Afghan Ministry of Health in making informed decisions to reduce malnutrition among children in Afghanistan.

In the following chapter, I described the problem statement, the purpose of this cross-sectional study, and the importance of promoting complementary feeding practices among infants and young children in Afghanistan. I also defined my research questions and hypotheses, the theoretical framework, the nature of this research study, the analytical strategies, and the challenges and limitations.

Chapter 2: Literature Review

Strategy of Search

I applied a systematic and comprehensive search strategy guided by the study purpose, research questions, research design, and theoretical framework in this research study. To conduct a systematic and meaningful search of relevant literature sources, policies, strategies, guidelines, and academic documents, I organized the essence of specific search methods related to my topic of study. The paradigms of literature review for this survey research study aimed to understand the patterns of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in poor and developing countries. It is worth mentioning no study has been conducted to determine the levels of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in Afghanistan. Meanwhile, several household surveys have been conducted to determine the patterns of breastfeeding practices in Afghanistan (UNICEF & CSO, 2012). Therefore, the scope of my literature review was mainly grounded on exploring the levels of knowledge, attitudes, and practices of mothers regarding the key concepts of complementary infant feeding practices in poor and developing countries. These concepts included the time of introduction of complementary foods for infants, responsive feeding practices, safe preparation and storage of complementary foods, the amounts of complementary foods needed at different ages during infancy, food consistency, meal frequency, and energy density during infancy. The scopes of the literature review also focused on exploring the patterns of nutrient content of complementary foods during infancy, the concept of using vitamins-minerals supplements during infancy, and patterns of feeding during and after illness for infants and young children (PAHO & WHO, 2001).

I obtained the information for this literature review from the various search engines and sources including websites, databases, peer-reviewed articles, academic and educational sources, policies, and strategies related to my research topic. The search engines and databases that I used for search purposes included MEDLINE, CINAHL, PubMed, ScienceDirect, PsycINFO, Cochrane Database, Database of Abstracts and Reviews of Effects (DARE), the WHO website, and websites of the Afghan Ministry of Health. I also used the Google Scholar to supply information for my literature review. I searched publications in the databases dated January 2000 through September 2016. I applied the following keywords when I conducted my research: *complementary feeding practices, knowledge, attitudes, practices*, *malnutrition, types of malnutrition, consequences*, *developing countries, social and cultural barriers*, *exclusive breastfeeding*, *frequency of complementary feeding*, *time of complementary feeding*, *responsive feeding*, *preparation of complementary foods*, *storage of complementary foods*, *amount of complementary foods*, *food consistency, vitamin-mineral supplements*, *complementary feeding during illness*, *complementary feeding after illness*, *cross-sectional survey*, *Health Belief Model*, and *Precaution Adoption Process Model.* I used some of these terms in combination with countries names including Afghanistan, India, Pakistan, Iran, Bangladesh, Tajikistan, Ethiopia, Ghana, Liberia, Nigeria, Vietnam, and China. I tried to restrict my search to scholarly articles, journals, academic and educational documents, policies, strategies, guidelines, dissertations, and other research studies published in the English Language. Moreover, I reviewed some paper-based documents including policies, strategies and guidelines, and reports of the cross-sectional household surveys belonging to Afghan Ministry of Health given the fact that some documents were not available in electronic version in Afghanistan. Conducting a systematic and thorough search of the relevant peer-reviewed articles, dissertations, policies, strategies, reports of household surveys, and medical journals turned out to establish a solid and translucent conceptual framework for my doctoral dissertation study, which is illustrated in the next sections of this chapter.

Background

At present, a significant gap exists in literature in understanding the knowledge, attitudes, and practices of mothers regarding complementary infant feeding in Afghanistan. More than 3 decades of war and political instability have resulted in paralyzing the health infrastructures in Afghanistan. In addition, protracted years of war and chaos have dilapidated the capacity of health professionals to design and implement quality research studies in Afghanistan. The Afghan Ministry of Health encounters a crucial shortage of valid and reliable data to make informed decisions to review its public health policies, strategies, and programs. The chronic shortage of valid and reliable data turned out to negatively affect the process of evidence-based decision making within the health sector in Afghanistan. As a result, Afghanistan maintains some of the worst health and nutrition indicators in Asia. UNICEF reported that the maternal mortality ratio is 327 of 100, 000 live births. The infant mortality rate is 74 of 1,000 live births and the younger than 5 years mortality rate is 102 of 1,000 live births in Afghanistan (UNICEF & CSO, 2012). The coverage of antenatal care services among pregnant women is 47.9%. The coverage of skilled birth attendants (SBAs) is 38.6% and the coverage of institutional deliveries (IDs) is 32.9%. The coverage of DPT Three vaccination among children is 40.2% and the coverage measles vaccination among children is 55.5% (UNICEF & CSO, 2012). Malnutrition is one of the major public health problems in Afghanistan. According to UNICEF, more than 50% of children are suffering from chronic malnutrition and 17.8% of children are suffering from acute malnutrition (UNICEF & CSO, 2012). Approximately 31.2% of children are underweight in Afghanistan. The alarmingly high rates of acute and chronic malnutrition have negatively affected the physical, mental, and intellectual health of children. Malnutrition also increases the risks of morbidity and mortality among infants and children and acting as a silent tsunami killing thousands of children in Afghanistan ever year (UNICEF & CSO, 2012).

The WHO confirmed the critical role of complementary foods during infancy and early childhood because the period of infancy and early childhood is known as a critical window to promote the physical, mental, and intellectual growths of children (PAHO &WHO, 2001). Some of the negative consequences of inappropriate complementary feeding practices include increasing the risks of morbidity and mortality among children and delaying children's physical, mental, and intellectual growths (PAHO & WHO, 2001). Therefore, the WHO recommended that it is essential to promote exclusive breastfeeding and appropriate complementary infant feeding practices among caregivers to prevent malnutrition and its irreversible health consequences (PAHO & WHO, 2001). The purpose of this maternal KAP survey was to determine the association between mothers' knowledge, attitudes, and practices regarding complementary feeding and malnutrition in children in Afghanistan. This research study was organized to assess the knowledge, attitudes, and practices of mothers regarding complementary feeding practices because there were several studies conducted to determine the patterns of breastfeeding practices among mothers in Afghanistan. This was the first quantitative cross-sectional survey research study to provide valid and reliable data regarding complementary infant feeding practices in Afghanistan. Thus, I aimed to assist the Afghan Ministry of Health and its partners to make evidence-based decisions in reviewing their nutrition policies, strategies, and programs to reduce malnutrition among children in Afghanistan.

The Concept of Complementary Feeding Practices

The WHO recommended that complementary foods are needed to be introduced when breast milk does not fulfill the nutritional requirements of the infants and young children (WHO, 2016). Complementary feeding practices are described as the process of transitioning a child from exclusive breastfeeding to semi-solid and solid family foods (PHAO & WHO, 2002). Such transition is needed to be initiated at the age of 6 months and continued until the age of 24 months. According to the WHO, it is a time when infants are at the greater risks of developing malnutrition. Therefore, promoting the concept of timely introducing complementary foods for infants is critical (WHO, 2016). Complementary foods must be adequate and according to the nutritional needs of the infants and young children. It means that complementary foods should be offered in a desirable amount, frequency, and consistency. It is very important to use foods of different varieties to meet the nutritional requirements of infants and young children (WHO, 2016). The WHO emphasizes on promoting the concept of preparation and storage of foods in a safe and hygienic manner. It means that the caregivers need to adopt all necessary measures to minimize the potential risks of contaminating foods with the micro-organisms and pathogens (WHO, 2016). Complementary foods ought to be offered in an appropriate texture. It means that complementary foods should have appropriate texture given the age of the infants and young children (WHO, 2016). Mothers should apply the principles of responsive feeding. It means that complementary foods should be offered by establishing a reciprocal bond between a mother and child. A mother should use different patterns of verbal and nonverbal communication cues to satisfy the status of hunger of her child. The concept of responsive feeding focused on applying the principles of psychosocial care (WHO, 2016).

The WHO recommended that the caregivers need adequate support to promote appropriate complementary infant feeding. Therefore, WHO organized a global level consultations to explore evidence-based strategies and interventions for promoting complementary feeding practices (WHO, 2016). These global level consultations on complementary feeding practices resulted in guiding some practical programmatic actions for the promotion of complementary feeding practices at community and household levels across the globe (WHO, 2016).

Descriptions of Key Concepts and Terms

Knowledge

The term *knowledge* is defined as “the set of facts, information, and ideas that acquired by a person” (UNICEF, 2014, pp. 11- 14). In this survey research study, the term *knowledge* is referred to the facts, information, or/and conditions that were possessed by the study participants (mothers) regarding the topic of complementary infant feeding in Afghanistan (UNICEF, 2014).

Attitudes

The term *attitude* is defined as “ ways of thinking or feeling about something or someone and are not always observable"(UNICEF, 2014, PP. 11 - 14). In this survey research study, the concept of *attitudes* refers to the belief, feeling, and behaviors of the study participants that have expressed regarding complementary infant feeding practices in Afghanistan (UNICEF, 2014).

Practice

The term *practice* is defined as “the observable behaviors, habits or skills, often performed without a conscious decision and in response to something in the environment or to knowledge or attitudes” (UNICEF, 2014, pp. 11 - 14). In this survey research study, the term *practice* refers to the observable use of knowledge and attitudes that result in performing complementary infant feeding practices among mothers who have children aged between 6 to 24 months. The term *practice* is also referred to the paradigm of processes in which the study participants are likely to exercise their knowledge and attitudes to practice complementary infant feeding. In this survey research study, the triad of knowledge, attitude, and practice constitutes the hierarchical structures to understand the patterns of complementary infant feeding practices among mothers in Afghanistan (UNICEF, 2014).

Malnutrition

The term *malnutrition* encompasses both undernutrition and overnutrition (UNICEF, 2006). According to UNICEF (2006) " people are malnourished if their diet does not provide adequate calories and protein for their growth, or they are unable to fully utilize the food that they eat due to illness. People are also malnourished if they consume too many calories" (para. 1).

Exclusive Breastfeeding

The WHO defines *exclusive breastfeeding* as "an unequaled way of providing ideal foods for the healthy growth and development of infants" (WHO, 2016, para. 1). *Exclusive breastfeeding* is considered as a critical public health intervention to promote the physical, mental, and intellectual growths of infants. The WHO recommended that infants must be exclusively breastfed during the first 6 months of their infancy and continued until the age of 2 years and beyond (WHO, 2016).

Weaning

The term *weaning* is referred to the process in which the breast milk is completely stopped and the infants are transitioned from breastfeeding to the semi-solid and solid foods (Foote & Marriote, 2003).

The Concept of Appropriate Complementary Feeding

According to WHO (2016), the term *complementary feeding* is defined as "the process of starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants and the transition from exclusive breastfeeding to family foods – referred to as complementary feeding" (para. 1). Complementary foods must be introduced for infants at the age of 6 months and continued until the age of 24 months and beyond. This period is referred as a critical window where infants are at higher risks of developing malnutrition (WHO, 2016).

Responsive Feeding

The concept of *responsive feeding* refers to applying the principles of psychosocial care as follows:

1) Infants and young children should be fed directly or/and assisted during feeding and mothers need to be sensitive to the hunger of their infants and their satiety cues that the infants and young children may demonstrate (WHO, 2001).
2) Mothers need to feed their infants slowly and patiently. Mothers should encourage their infants and young children to eat but do not force them to eat (WHO, 2001).
3) If children tend to refuse eating foods, mothers need to experiment a combination of different foods including taste, textures, and methods of encouragement (WHO, 2001).
4) Mothers should minimize distractions while feeding infants and young children, mothers should keep eye contact with infants and talk to them during feeding (WHO, 2001).

The Concept of Safe Preparation and Storage of Complementary Foods

The principles of safe preparation and storage of meals is described as the process of washing children and caregivers' hands prior to food preparation and serving, serving food immediately after preparation as well as safely storing foods, using clean utensils while preparing and serving meals, and avoiding the use of feeding bottles (WHO, 2001).

Amount of Complementary Food

Complementary foods should be started at the age of 6 months with the small amounts of foods and the quantity should be increased in accordance to the needs of infants and young children as they grow up older. At the same time, mothers should continue frequent breastfeeding (WHO, 2001). The WHO recommended that the amount of energy needs from complementary foods with an average breastmilk intake for infants and young children in developing countries are approximately 200 kcal per day at 6-8 months of age, 300 kcal per day at 9-11 months of age, and 550 kcal per day at 12-23 months of age (WHO, 2001). However, in developed countries, these estimates are different (130, 310 and 580 kcal/d at 6 - 8, 9 -11, and 12 - 23 months, respectively (WHO, 2001).

Food Consistency

The WHO recommended that mothers need to increase food variety and consistency in accordance with the infant's growths and energy requirements. The WHO also recommended that infants should be offered semi-solid foods, mashed foods, vegetables, and fruits at the age of 6 months (WHO, 2001). At the age of 8 months, mothers should give finger foods to their infants (WHO, 2001). The concept of finger foods refers to snacks which are only given to infants (WHO, 2001). At the age of 12 months, mothers should feed their infants with the same type of foods which are consumed by other family members (WHO, 2001).

Meal Frequency and Energy Density

The WHO recommended that the frequency of complementary foods should be increased as the infants are growing older (WHO, 2001). The frequency of feeding accounts for the types and amounts of local foods consumed each time by the infants and young children. It also depends on the energy density of locally available foods that families are consuming (WHO, 2001). The WHO recommended that a healthy infant at the age of 6 to 8 months needs to be fed between 2 to 3 times in a day (WHO, 2001). At the age of 9 to 11 months, infants need to be fed 3 to 4 times in a day. At the age of 12 to 24 months, young children should be fed with additional snacks (fruits, bread, nuts) 1 to 2 times a day. If children are not breastfed, it is recommended that more frequent meals should be offered to young infants given their energy requirements (WHO, 2001).

Dietary Diversity of Complementary Foods

According to the WHO, infants and young children need to consume different varieties of foods to make sure that their nutritional requirements are fulfilled (WHO, 2001). Meals such as fish, meat, eggs, vegetables, fruits, and foods containing adequate fat should be offered daily to infants and young children. Mothers need to avoid feeding their infants the drinks such as tea, coffee, and sugary drinks which are known to be low energy density drinks because such drinks will replace more nutrient-rich foods (WHO, 2001).

Using Vitamin-Mineral Supplements for Infants, Pregnant and Lactating Women

The WHO recommended that vitamin-mineral supplements and fortified products that need to be consumed by infants, pregnant, and lactating women. Consuming vitamin-mineral supplements and fortified products are required to meet the essential daily energy needs of infants, pregnant, and lactating women in most of the poor and developing countries (WHO, 2001).

Feeding during and after Illness

According to the WHO, mothers should increase the frequency of breastfeeding to infants during the illness; the concepts of responsive feeding practices should be promoted during and after an illness. Infants and young children should be encouraged to consume more soft and appetizing foods during and after illness (WHO, 2001).

In this quantitative research study, I attempted to determine the levels of knowledge, attitudes, and practices of mothers regarding complementary infant feeding in Afghanistan. This study is worth conducting because it added to the bodies of literature to guide the process of evidence-based practices for addressing the problem of malnutrition among children in Afghanistan. In this chapter, I attempted to describe the relationships of this study with the studies conducted on the similar topic in other poor and developing countries. This study is different from other research studies because I applied the PAPM to determine the association of maternal KAP regarding complementary feeding and malnutition in children in Afghanistan. I also applied the WHO's guiding principles for complementary feeding of the breastfed child to determine the patterns of maternal KAP on complementary infant feeding in Afghanistan. Applying a valid theory of behavior changed along with the WHO's guiding principles for complementary feeding practices have made this study distinctive from the previous studies conducted by the other researchers (Rudestam & Newton, 2015). The findings reflected in the literature review chapter are accumulated from the systematic reviews of multiple quantitative cross-sectional studies, experimental studies, demographic household surveys, and the findings of studies based on administrative data (Betal, Boulghourjian, & Akik, 2010; Das, Chattopadhyay, Chakraborty, & Dasgupta, 2013; Hanif, 2011; Issaka, Agho, Burns, & Page, 2014; Lassi, Zahid, Imdad, & Bhutta, 2013).

Breastfeeding Practices

According to the PAHO and WHO (2002), exclusive breastfeeding is practiced from the birth until the age of 6 months and complementary foods are introduced at the age of 6 months to all infants. Koksal, Yalçın, Pekcan, Ozbaş, Tezel, and Kose (2015) used a cross-sectional survey research to determine the patterns of breastfeeding practices among mothers in three regions in Turkey. A multistage stratified random sampling technique was used to identify the study participants. The sample size included a total of 1486 mothers and their children aged 12 to 23 months in Turkey. The researchers measured the patterns of breastfeeding practices and potential factors affected breastfeeding practices among mothers in Turkey. The results of this cross-sectional survey showed that 98.7% of infants were ever breastfed in Turkey. The researchers did not found a statistically significant difference among three study regions in term of infants and young children being ever breastfed (p-value > 0.05). The time of exclusive breastfeeding was reported to range from 2.7 to 7.6 months among mothers in

Turkey. The researchers recommended that health and nutrition education should be provided for mothers to improve the level of knowledge of mothers regarding exclusive breastfeeding in Turkey. Mohmood, Srivastava, Shrotriya, and Mishra (2012) utilized a quantitative cross-sectional research design to measure the patterns of exclusive breastfeeding practices among mothers in Utter Pradesh in India. The researchers found that over 40% of women did not have appropriate knowledge regarding the benefits of exclusive breastfeeding in Utter Pradesh India.

Ndubuka, Ndubuka, Li, Marshall, and Ehiri (2013) applied a cross-sectional survey research to determine the level of knowledge, attitudes, and practices of breastfeeding among Human Immunodeficiency Virus (HIV) -infected pregnant women. The researchers analyzed the role of other factors that influenced the patterns of exclusive breastfeeding and complementary feeding practices among HIV-infected mothers in Botswana. The researchers applied a random sampling strategy to select their study participants in the four public health facilities in Gaborone, Botswana. The study participants were randomly selected from HIV-infected pregnant women who attended four infectious disease control public health facilities to receive treatment for HIV in Gabarone. A total of 96 HIV-infected pregnant women were included in the study sample. The researchers conducted face to face interviews with study participants in the selected public health facilities.

The researchers also transcribed data from the medical records of the HIV-infected pregnant women to their questionnaires. The researchers collected information on sociodemographic characteristics of the study participants, important clinical information, knowledge of HIV-infected pregnant women regarding mother to child transmission of HIV, and complementary infant feeding practices. The researchers found that only 50% of the study participants had knowledge regarding mother to child transmission of HIV through breastfeeding. The researchers also found that health education and counseling were statistically significantly associated with decisions to promote exclusive breastfeeding practices among mothers (OR 5.38, 95% CI 1.83 to 15.81). In addition, the study participants who received health education services regarding prevention of mother to children transmission of HIV infection had the higher level of knowledge regarding exclusive breastfeeding (OR 5.91%, 95% CI 1.06 to 34.31). HIV-infected pregnant women who received health education and awareness raising services did not express their deep concern regarding stigma associated with HIV. They had a statistically significantly higher level of knowledge on appropriate infant feeding practices (OR 5.91, 95% CI 1.69 to 15.56) in Botswana. The researchers recommended that HIV-infected women need more health education and awareness raising services to guide them making informed decisions regarding improving exclusive breastfeeding and complementary infant feeding practices in Botswana.

Roy, Dasgupta, and Pal (2009) applied a quantitative cross-sectional study to determine the level of knowledge, attitudes, and practice of mothers regarding exclusive breastfeeding in Kolkata India. The researchers found that these practices were low among study participants comparing the WHO’s standards of exclusive breastfeeding for infants. The rates of exclusive breastfeeding practices among infants less than 6 months were 28.3%. In Uganda, the majority of infants were exclusively breastfed until the age of 6 months. The researchers found that about 29.2% of infants were not exclusively breastfed until the age of 6 months. However, a small number of children (9.2%) were breastfed until the age of 2 years (Isingoma, Samuel, Edward & Maina, 2016).

According to Betal et al., (2010), about 18.1% of mothers initiated exclusive breastfeeding for their babies within the first hour of the delivery and 55.9% of mothers initiated exclusive breastfeeding within the few hours of their deliveries in Lebanon. The researchers concluded that despite the fact that over 70% of mothers initiated exclusive breastfeeding, over 40% of them terminated exclusive breastfeeding before the age of 6 months for their infants. Such patterns of exclusive breastfeeding practices among infants and young children are low given the WHO's standards of exclusive breastfeeding practices. Hanif (2011) found that the prevalence of early initiation of breastfeeding within the first hour of delivery among the mothers was 65.5% (95% CI: 64.3 – 66.8) and the prevalence of exclusive breastfeeding among mothers was 37.1% (95% CI: 34.0 – 40.2) in Pakistan.

Complementary Feeding Practices and Introduction of Complementary Foods

Issaka et al. (2015) analyzed the secondary data of demographic and health surveys conducted in four African Countries namely Ghana, Nigeria, Sierra Leone, and Liberia to assess the determinants of complementary feeding practices among mothers who had children aged 6 to 23 months. The total sample size included 12623 children aged 6 to 23 months, 822 children from Ghana, 1557 children from Sierra Leone, 8786 children from Nigeria, and 1458 children from Liberia. Multivariate and logistic regression analyses were conducted to assess the correlations between mother's literacy, post-natal visits, children age, geographical regions, and the introduction of complementary food for infant and young children in 4 African Countries. The researchers found that literacy level of mothers were statistically significant determinants of introducing solid and semi-solid foods for infants and young children. Literate mothers were more likely to introduce solid and semi-solid foods to their infants as compared to the illiterate mothers (OR: 3.55; 95% CI 1.05 – 12.02; P-value < 0.05). In Nigeria, the age of infants and young children were statistically significantly associated with the introduction of solid and semi-solid foods. The mothers who had children aged between 12 to 23 months were 1.9 times more likely to introduce solid and semi-solid foods to their children at their older age (OR: 1.91; 95% CI 1.09 – 3.35; P value > 0.05). Mothers who did not attend ante-natal clinics were less likely to introduce solid and semi-solid foods as compared to mothers who attended antenatal visits respectively (OR: 0.13; 95% CI 0.03 – 0.55), (OR: 0.05; 95% CI 0.03 – 0.33) in Liberia and Sierra Leone.

Kassa, Meshesha, Haji, and Ebrahim (2016), applied a quantitative cross-sectional survey research study to determine the patterns of complementary feeding practices and the factors influencing the patterns of appropriate complementary feeding practices among mothers in Southern Ethiopia. The sample size included 611 mothers and their children aged 6 to 23 months. The study participants were randomly selected through using a multistage sampling strategy. The researchers used logistic regression modeling to analyze the data of this cross-sectional study. The researchers found that 73% of mothers introduced complementary foods at the age of 6 months to their infants. The researchers also found that the level of education of mothers and family size were the key predictors of complementary feeding practices among mothers in Ethiopia. Mothers who attended primary schools were 3.2 times more likely to practice complementary infant feeding (AOR: 3.24; 95% CI: 1.28 - 8.20). Mothers who attended secondary and high schools were 3.2 times more likely to practice complementary infant feeding in Ethiopia. Mothers with smaller family size were 12.10 times more likely to practice appropriate complementary infant feeding (AOR: 12.10; 95 % CI: 1.10 - 139.7) in Ethiopia. Inappropriate complementary feeding practices were observed among illiterate mothers who had large family size. The researchers recommended that nutrition education and counseling are important to be provided for the caregivers in South Ethiopia.

Lassi, Zahid, Imdad, and Bhutta (2013), conducted a systematic review of randomized and non-randomized trial studies to determine the effects of health education and complementary infant feeding practices with regard to growth and morbidity of infants and young children aged less than 2 years in developing countries. The researchers used multiple search engines namely google scholar, the WHO database, Cochrane Electronic Library, and PubMed. The search date was identified as of October 2012. The researchers excluded the articles aiming at providing therapeutic or supplementary interventions for infants and young children. After conducting a systematic search of the peer-reviewed articles, the researchers included a total of 701 studies in the review. After excluding studies for title screening, screening of abstracts, and assessing the inclusion and exclusion criteria, a total of (n=16) studies were included in the final review. Among these 16 studies, 9 research studies offered health education on complementary infant feeding practices in developing countries, 6 research studies provided complementary infant feeding practices with or without health education interventions in developing countries, and 1 research study provided both complementary infant feeding and health education interventions (Lassi et al., 2013).

The researchers found that providing health education regarding complementary infant feeding practices significantly improved HAZ (SMD: 0.23; 95% CI: 0.09 - 0.36). The researchers also found that providing health education regarding complementary infant feeding practices significantly improved WAZ (SMD: 0.16, 95% CI: 0.05- 0.27). In addition, the researchers found that providing health education to mothers on complementary infant feeding practices significantly reduced the rates of stunting among children (RR 0.71; 95% CI: 0.56 - 0.91). However, providing health education to mothers on complementary feeding practices did not significantly improved height and weight gain among infants and young children in developing countries. The researchers recommended that complementary feeding practices turned out to improve the health and nutrition status of infant and children in developing countries. They recommended that it is important to combine cost-effective and affordable health education services along with public nutrition interventions to improve the health and nutrition status of infants and children in developing countries.

The researchers used a cross-sectional research study to analyze the patterns of morbidity and nutritional status of infant and young children aged 7 to 24 months in Uganda. The key driving factors that influenced the timing of introduction of complementary foods was the level of education of mothers, the age of mothers, and marital status (monogamy or polygamy status) of the families (Isingoma et al., 2016). The researchers found that 52.7% of the mothers introduced complementary foods at the age of 6 months and 36% of mothers introduced complementary foods to their infants after the age of 6 months. A small number of mothers (11.8%) introduced complementary foods for their infants at the age of less than 6 months. The researchers found that improper timing of introduction of complementary foods to infants was statistically significantly correlated with the status of education of mothers, the age of mothers and monogamy or polygamy status of the families. Mothers with no formal education, mothers aged less than18 years, and polygamy of families at P-value < 0.05 (Isingoma et al., 2016). The researchers concluded that empowering communities to utilize local resources and improving health and nutrition education of the mothers will avert the negative consequences of malnutrition among infants and young children (Isingoma et al., 2016).

Betal et al. (2010) analyzed the timing of introduction of complementary feeding foods for infants among mothers in Lebanon. The timing of introduction of complementary foods for infants was influenced by the status of employment of women in Lebanon. The results of this quantitative research study highlighted that 21.9% of mothers introduced complementary foods for their infants at the age of 2 to 3 months and 63.5% of mothers introduced complementary foods at the age of 4 months. Over 60% of mothers introduced solid foods for their infants prior to the age of 6 months and 90% of mothers gave different types of fluids to their infants at the age of 4 months. The researchers concluded that such inappropriate patterns of complementary feeding practices increased the risk of diarrheal disease among infants (Betal et al., 2010).

Hanif (2011) analyzed the secondary data of the demographic and health surveys conducted from 1990 to 2007 in Pakistan to assess the patterns of exclusive breastfeeding and complementary infant feeding practices using the WHO's guidelines. The secondary data of 5 nationally representative demographic and health surveys were reviewed and analyzed to assess the WHO's 5 key indicators related to breastfeeding and complementary feeding practices in Pakistan. The results of analyses showed that the patterns of complementary infant feeding practices were low among mothers in Pakistan. The prevalence of introduction of solid and semi-solid food for infants aged 6 to 9 months was 36.3% (95% CI: 32.4 – 40.2) in Pakistan. The researcher recommended that it is important to design and implement health and nutrition education interventions to improve breastfeeding and complementary infant feeding practices among mothers in Pakistan.

Issaka et al. (2014) analyzed the secondary data of demographic and health survey conducted in 2008 in Ghana. The researchers studied the patterns of complementary feeding practices and risk factors which were associated with inappropriate complementary infant feeding practices among mothers in Ghana. The sample included 822 mothers and children aged 6 to 23 months. A multiple logistic regression modeling was performed to analyze the data of this health and demographic survey in Ghana. The researchers found that (72.1%; 95% CI 64.6 - 79.3) of mothers introduced solid and semi-solid foods for their infants at the age of 6 to 8 months in

Ghana. It was also found that the level of literacy of mothers was statistically significantly associated with appropriate complementary infant feeding practices in Ghana. Literate mothers were 3.55 times more likely to practice complementary infant feeding as compared to illiterate mothers in Ghana (AOR: 3.55; 95 % CI 1.05 - 12.02). In another study in Ghana, the researchers analyzed the patterns of complementary infant feeding practices among mothers applying the WHO's guideline for complementary feeding of the breastfed child. The researchers concluded that improving mothers' literacy, promoting post-natal care, institutional delivery, and providing health and nutrition education may contribute in promoting appropriate complementary feeding practices among mothers in Ghana (Issaka et al., 2014).

The researchers applied a cross-sectional study to measure complementary infant feeding practices among mothers in Turkey. Comparing the WHO's standard for the right time to introduce complementary foods for infants; the researchers found that 45% of the mothers introduced complementary foods before the age of 6 months to their infants. These mothers introduced bread, rice, vegetables, and dairy before the age of 6 months and meat, poultry, and fish after the age of 6 months to their infants in Turkey (Koksal et al., 2015). In another cross-sectional study in India, the researchers found that about 26% of mothers did not have knowledge regarding the right time of introduction of complementary foods to their infants (Mohmood, Srivastava, Shrotriya, & Mishra, 2012)

Marriott, Campbell, Hirch, and Wilson (2007) conducted a comprehensive review of demographic household surveys that were operationalized in 20 developing countries from 1999 to 2003 to evaluate the levels of knowledge and practice of caregivers regarding complementary infant feeding. The results of review household surveys showed that the majority of caregivers had minimal knowledge regarding appropriate complementary feeding practices. The researchers found that caregivers were occasionally served semi-solid foods to their infants before the age of 6 months in many developing countries.

According to Roy et al. (2009), about 29% of the mothers had proper knowledge regarding the right time of introduction of complementary foods for their infants in Kolkata, India. The researchers also found that social and economic factors were among the key driving factors that influenced the practice of complementary feeding in Kolkata, India. The researchers recommended that health and nutrition education may play a key role in improving appropriate complementary feeding practices among communities in India.

In a quantitative cross-sectional survey conducted in Tajikistan to determine the patterns of complementary feeding practices among mothers, the results of the survey showed that 86% of mothers viewed that complementary foods should be initiated at the age older than 6 months for infants. About 3% of mothers viewed that complementary foods should be introduced at the age of 4 months for infants. About 55.7% of mothers viewed they introduced complementary foods because their babies were hungry (Action Against Hunger International, 2007). About 7.8% of mothers ‘decisions were influenced by their mothers-in-law to introduce complementary foods to their infants. About 5.1% of mothers introduced complementary foods for their infants because they did not have sufficient breast milk. The researchers found that there was an association between the process of initiation of complementary foods and weight loss in infants. About 12% of mothers reported that their children have lost weight while complementary foods were introduced to them (Action Against Hunger International, 2007). The researchers concluded that mothers had insufficient knowledge regarding the right time of introduction of complementary foods. The findings of this research study were applied to design health education and behavior change programs to promote appropriate complementary feeding practices in rural areas in Tajikistan (Action Against Hunger International, 2007).

UNICEF (2014) applied a cross-sectional survey research study to determine the levels of knowledge, attitudes, and practices of mothers and their influence regarding early childhood development in Solomon Island. The aims of this maternal KAP survey were to determine the patterns of complementary infant feeding practices among mothers. The researchers studied the right time of introduction of complementary foods and sources of information of mothers regarding complementary feeding practices in Solomon Island (UNICEF, 2014). The data were collected from 284 households. The study participants included mothers who had a child aged between 6 months to 5 years in the study. The results of this maternal KAP survey showed that 52% of mothers have introduced complementary foods prior to the age of 6 months for their infants in Solomon Island. Solid and semi-solid foods were introduced for infants at the age of 3 to 12 months. 34% of mothers introduced solid foods at the age of 6 months for their infants and 33% of mothers introduced solid foods for their infants at the age of 7 months. About 75% of mothers introduced complementary foods for their infants based on the advice they received from the doctors and other health workers visiting their houses. About 32% of mothers introduced complementary foods based on the advice from their grandmothers and their relatives (UNICEF, 2014).

Meal Frequency

Isingoma et al. (2016) analyzed the meal frequency practice of complementary foods among mothers as compared to the WHO's guiding principles for complementary feeding of the breastfed child given offering 2 meals at the age of 6 – 8 months, 3 meals at the age of 9-23 and 4 meals at the age of 6 – 23 months for the nonbreastfed children in Uganda. The researchers concluded that the meal frequency practice of complementary foods among mothers was low as compared to the WHO's guideline. About 24.2% of infants aged 7 to 8 months were provided with 2 meals. About 29.2% of infants aged 11-12 months were provided with 3 meals and 48.5% of children aged 12-24 were provided with 4 meals. The researchers concluded that more than 50% of children did not meet the recommended meal frequency of complementary foods as per the WHO's guideline. Promoting appropriate complementary infant feeding practices at the household level need to be prioritized to prevent the negative consequences of malnutrition in early childhood in Uganda (Isingoma et al., 2016).

The researchers analyzed demographic and health survey data to assess the practices of minimum meal frequencies among mothers in Ghana, Nigeria, Sierra Leone, and Liberia. The researchers applied the WHO's standards to compare the practices of meal frequency among children 6 to 23 months in 4 African countries (Issaka et al., 2015). The researchers found that the age of children, access to media, and the number of antenatal visits were the risk factors for not meeting the minimum meal frequency in 4 African countries. Mothers who had children 18-23 months were 18% less likely to report that their children not meeting the minimum meal frequency as compared to the mothers who had children 6-11 months (OR: 0.82; 95% CI 0.67 – 0.98; P-value < 0.03). Mothers who listened to the radio programs were 31% less likely to report that their children were not meeting the minimum meal frequency as compared to the mothers who did not listen to the radio (OR: 0.69% CI 0.57 – 0.82; P-value < 0.001). Mothers who attend four antenatal visits were 40% less likely to report that their children were not meeting the minimum meal frequency as compared to mothers who did not attend any antenatal visits (OR: 0.60; 95% CI 0.44 – 0.82; P-value < 0.001) (Issaka et al., 2015).

Issaka et al., (2014) found that the level of practicing the WHO's minimum standards of meal frequency was low among mothers in Ghana. About 46% (95% CI 42.3 - 49.9) of infants aged 6 – 23 months met the WHO's minimum standard of meal frequency in Ghana. Lower knowledge of mothers regarding the WHO's standards of complementary infant feeding practices accounted for such noncompliance. In south Ethiopia, 67% of infants met the minimum meal frequency (Kassa et al., 2016). The WHO recommended that the minimum meal frequency standard should be increased to 90% in infants in poor and developing countries (PAHO & WHO, 2002).

Nutrition Diversity

The researchers applied a cross-sectional survey to assess the nutrition content of complementary foods provided to infants and young children in Uganda. The researchers used structured questionnaires to collect information regarding 7 food items to assess the nutritional diversity of complementary foods introduced to infants. According to Isingoma, Samuel, Edward, and Maina (2016) argued that the low level of education of mothers were the key driving factors to influence the practice of nutritionally diverse foods among mothers. The study concluded that 41% of children had access to 4 or more foods (Isingoma et al., 2016). About 50% of children were either relied on millet porridge or family foods. The utilization of poultry, fish, dairy, and fruits was at a minimal level among mothers (Isingoma et al., 2016). The study concluded that parents need to utilize locally available foods to increase the appropriate practice of nutritionally diverse complementary foods for the prevention of the consequences malnutrition (Isingoma et al., 2016).

The nutritional diversity of complementary foods should not be overlooked. Betal et al., (2010) study found that certain foods were excessively consumed by infants in Lebanon. For instance, children in rural areas consumed more vegetables and children in urban areas consumed more fruits. Meats were consumed lesser by children in the rural areas. Avoidance of consumption of meat, poultry, and fish may influence the optimal growth of children in Lebanon.

Issaka et al., (2014) analyzed demographic health survey data in Ghana to study the practice of nutritional diversity of complementary foods among children aged 6 to 23 months comparing the WHO’s guideline. The researchers found that 51.4% (95% CI 47.4 - 55.3) of infants and young children met the minimum dietary diversity of the WHO’s guideline in Ghana. About 29.9% (95% CI 26.1 - 34.1) of infants and young children met the minimum acceptable diet of the WHO’s guideline in Ghana. According to Issaka et al., (2014), mothers who did not seek post-natal care were less likely to meet the WHO's standard of meeting the minimum diverse diet as compared to mothers who visited health workers for the post-natal checkup in Ghana. The status of delivery of mothers at the health facilities was statistically significantly associated with meeting the minimum dietary diversity of the WHO's standard in Ghana. Mothers who delivered at the health facilities were 1.9 times more likely to practice the standard of minimum dietary diversity as compared to mothers who delivered at homes (AOR: 1.87; 95% CI 1.24 – 2.81).

The researchers analyzed the secondary data of demographic and health survey to assess the nutrition diversity of complementary infant feeding practices in Ghana, Nigeria, Sierra Leone, and Liberia (Issaka et al., 2015). The researchers found that the age of infants was a risk factor for the introduction of the minimum food diversity in all four countries. In Sierra Leone, the mothers who had children aged between 12 to 17 months were less likely to introduce diverse foods to their infants and young children as compared to mothers who had children aged older than 12 to 17 months (OR: 0.37; 95% CI 0.28 – 0.48; P-value < 0.05). In Liberia, mothers who had young children aged 12 to 17 months were less likely to introduce diverse foods as compared to the mothers who had children aged older than 12 to 17 months (OR: 0.46; 95% CI 0.31 – 0.70; P-value < 0.05). In Nigeria, mothers who had children aged 12 to 17 months were less likely to introduce diverse foods as compared to the mothers who had children aged older than 17 months (OR: 0.39; 95% CI 0.32 – 0.47; P-value < 0.05). The researchers recommended the implementation of health education interventions to promote appropriate complementary infant feeding practices in West African Countries (Issaka et al., 2015).

The researchers found that the rates of meeting the minimum food diversity were low among the mothers who had children aged 6 to 23 months in South Ethiopia as compared to the WHO's standard of dietary diversity. According to Kassa et al., (2016), about 19% of infants met the minimum dietary diversity standard in South Ethiopia.

Comparing the WHO's standard of meeting minimum food diversity among mothers in Turkey, the researchers found that over 90% of infants were served vegetables, fruits, yogurt, and bread. Over 70% of infants were served meat (poultry, beef, and sheep) and over 60% of them were served fish and cow milk. The researchers concluded that infants and young children ate nutritionally diverse food in Turkey (Koksal et al., 2015).

According to UNICEF (2014), dietary diversity was considered as the most important indicator to improve the nutritional status of children in Solomon Island. The researchers found that 19% of infants were met the minimum standard of 4 or more diverse complementary foods in Solomon Island. The researchers also found that 38% of infants ate animal flesh, 15% ate dairy, 33% ate fruits, and 95% ate vegetables, rice, and bread (UNICEF, 2014).

Responsive Feeding

According to UNICEF (2014), the researchers conducted a cross-sectional research study to analyze the patterns of responsive feeding practices as compared to the WHO's standard among mothers in Solomon Island. The researchers concluded that mothers were engaged in responsive feeding practices in Solomon Island. The results of this maternal KAP survey showed that 100% of caregivers were engaged in talking and encouraging their infants during feeding. The researchers found that 100% of caregivers sat during feeding with their infants and young children and 89% of caregivers encouraged their infants and young children to finish their meals. The researchers also found that 39% of caregivers forced their infants and young children to finish their meals (UNICEF, 2014)

Safe Preparation and Storage of Complementary Foods

Saleh, Ara, Hoque, and Alam (2014) used a cross-sectional quantitative study to measure the practice of safe preparation and storage of complementary foods among mothers who had children less than 2 years of age in the Slum Areas of Dhaka City in Bangladesh. The researchers applied a convenient sampling strategy to select a sample of 120 mother-child pairs. The researchers assessed mother's hygiene practices during the process of food preparation and feeding as per the WHO's recommended guideline. The researchers found that 17% of mothers washed their hands after defecation. The researchers concluded that the level of knowledge of parents, cultural and social factors, proper preparation, and storage of complementary foods were the key determinants that influenced the patterns of complementary feeding practices among mothers. The researchers concluded that promoting exclusive breastfeeding and safe preparation, and practice of complementary foods will reduce child mortality by 19%. The researchers recommended that promoting safe preparation and practice of complementary foods as per the WHO's standards are important to promote appropriate complementary feeding practices in India.

Feeding during and after Illness

According to Isingoma et al., (2016), diarrhea, respiratory infections, and malaria were exacerbated by malnutrition among children in Uganda. The episodes of disease especially diarrhea influenced the patterns of complementary feeding practices among infants in Uganda. The researchers argued that diarrhea reduced dietary intake by more than 40% among infants in Uganda (Isingoma et al., 2016).

Pantenburg, Ochoa, Ecker, and Ruiz (2014) applied a quantitative research design to study the levels of knowledge, attitudes, and practices of mothers regarding complementary feeding practices during the episodes of diarrhea among infants in Lima. The researchers interviewed 390 mothers in Lima. The researchers found that 72% of the mothers either discontinued or gave lesser foods to their children during the episodes of diarrhea. About 22% of study participants believed that feeding children during illness are harmful. About 40% of caregivers withheld giving fruit and vegetables to their children during the episodes of diarrhea. The researchers concluded that poor awareness of mothers regarding appropriate complementary feeding practices during illness resulted in increasing the risks of malnutrition and mortality among infant and young children. The researchers recommended that providing health education to mothers may create positive behaviors to promoting complementary appropriate feeding practices during and after illnesses in communities in Lima.

The Influence of Socioeconomic and Demographic Factors

Isingoma et al., (2016) applied a cross-sectional research study to analyze the influence of sociodemographic characteristics of families on nutritional and morbidity status of the children aged between 7 to 24 months in Uganda. After studying the role of sociodemographic factors and their associations with complementary feeding practices, the researchers concluded that sociodemographic factors influenced the time of initiation of complementary foods, meal frequency, and the dietary diversity of complementary foods. The researchers argued that sociodemographic factors aggravate the pattern of disease among infants and young children in Uganda (Isingoma et al., 2016). Among the sociodemographic indicators, maternal education, and the age of mothers were the key driving factors to influence complementary infant feeding practice in Uganda (Isingoma et al., 2016). The researchers recommended that providing counseling to mothers is important for promoting complementary feeding practices. Mothers needed more support to utilize locally available resources to improve the nutritional intake of infants and young children at the community and household levels. Improving coordination and collaboration between different sectors empower the communities to promote complementary infant feeding practices in Uganda (Isingoma et al., 2016).

Paul, Muti, Khalfan, Humphrey, and Caffarella (2011) applied a mixed-methods research design to assess the role of contextual factors in influencing complementary feeding practices in poor communities in Sub-Saharan Africa. The researchers found that social, physical, and cultural factors were influencing the patterns of complementary infant feeding practices in poor African countries.

Use of Theories of Health Behavior Change in Complementary Feeding Surveys

The researchers applied the Health Belief Model in order to analyze the effectiveness of health education and awareness raising interventions with regard to complementary feeding practices among mothers in Ethiopia (Mulualem, Henry, Bernanu, & Whiting, 2016). The researchers analyzed the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding at the baseline and follow-up studies. The health belief model was used to create health education and awareness raising intervention for 160 mothers in Ethiopia. The researchers found that applying the health belief model was an effective tool in promoting maternal KAP regarding complementary infant feeding practices (p-value < 0.05) in Ethiopia. Using the health belief model, the researchers concluded that the dietary diversity of complementary food practices increased among mothers from 3.05 ± 0.94 in baseline to 3.79 ± 0.82, $p < .05$ in the follow-up survey. The researchers also concluded that applying health behavior models is effective to help mothers practice complementary infant feeding (Mulualem et al., 2016).

The theory of planned behavior change was applied to influence the level of knowledge, attitudes, and practices of mothers to promote the WHO's standard of timely introduction of complementary foods (Hamilton et al., 2011). The researchers applied the constructs of planned behavior change model to assess the subjective norms, perceived behavioral control, and complementary feeding practices of mothers. The researchers concluded that the age of mothers (being order), the normative beliefs of mothers, and perceived intentions of mothers were among the influencing factors regarding complementary feeding practices (Hamilton et al., 2011).

The Link of Theoretical Framework and Study Variables to Identify the Gaps in Complementary Feeding Practices in Afghanistan

The results of the systematic and comprehensive literature reviews on patterns of complementary infant feeding practices showed that the researchers often did not apply theoretical frameworks, models, and constructs in their research studies to identify the gaps in complementary feeding practices. Most of the researchers found it challenging to apply the theoretical frameworks, models, and constructs in their studies because using theoretical frameworks probably was challenging to tie up their research designs and measuring variables to the frameworks and constructs of the theories of behavior change (Ryan, 2010). I applied the PAPM to link my study design and measuring variables with the constructs of the PAPM to determine the patterns of knowledge, attitudes, and practices of mothers regarding complementary infant feeding. I also applied the frameworks and constructs of the PAPM to quantify the association between mothers' knowledge, attitudes, and practices about complementary feeding and malnutrition in their children (Glanz, Rimer, &Viswanath, 2008). I labeled the constructs of the PAPM in a stagewise manner to tie up the gaps in knowledge, attitudes, and practice of mothers regarding complementary feeding and how they were correlated with the nutritional status of their children. Applying the framework of PAPM helped me tie up the gaps in knowledge and attitudes of mothers by assessing if they knew about the appropriate complementary feeding practices, decided about practicing complementary infant feeding practices, and finally started practicing complementary infant feeding (Glanz et al., 2008). In addition, I applied the PAPM framework to explain how mothers ended up fostering their knowledge, attitudes to practice complementary infant feeding. How mothers' knowledge, attitudes, and practices regarding complementary infant feeding influenced the nutritional status of their children in Afghanistan (Glanz et al., 2008).

Finally, I applied the PAPM framework to tie up my research study variables with the PAPM framework to foster the level of knowledge, attitudes, and practices of mothers by directing mother-centered public nutrition interventions for the implicatons of influencing a positive social change in Afghanistan (Ryan, 2010).

Summary

In the following chapter, I presented the results of the literature review regarding complementary feeding practices among mothers in poor and developing countries. The purpose of the systematic and comprehensive literature review was to compare and contrast the relationship of this study with the previous works have been done by the researchers to analyze the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding in other poor and developing countries. There is no reason to believe that why theories of behavior change are not widely applied in public health research studies especially assessing maternal knowledge, attitudes, and practices regarding complementary infant feeding. There are few studies existed where the researchers applied the theories of behavior change to analyze the level of knowledge, attitudes, and practices of the mothers regarding complementary feeding practices (Hamilton et al., 2011).

As per the WHO's guiding principles for complementary feeding of the breastfed child, there are significant literature gaps exist in understanding the patterns of appropriate complementary infant feeding practices in Afghanistan and other poor and developing countries. Inappropriate complementary feeding practices turned out to increase the rates of malnutrition among children (PAHO & WHO, 2002). As a result, malnutrition aggravates the rates of morbidity and mortality among children. In long term, it affects the physical, intellectual, and working capacity of children in adult age (PAHO & WHO, 2002). However, most of the studies that had assessed the level of knowledge, attitudes, and practices of mothers regarding complementary feeding practices did not provide the essence of information regarding to what extent the mothers had been practicing the guiding principles of complementary feeding for the breastfed child recommended by the WHO (PAHO & WHO, 2001). According to the WHO, the essence of appropriate complementary feeding practices consists of notion of responsive feeding, safe preparation and storage of complementary foods, amount of complementary foods served, food consistency, meal frequency and energy density, nutritional content of complementary foods, vitamin and mineral supplement for infants and feeding patterns during and after illness (PAHO & WHO, 2002).

This study aimed to determine the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding. It also assessed the association between mothers' knowledge, attitudes, and practices regarding complementary feeding and malnutrition in children in Afghanistan.

According to Betal et al., (2010), about 90.1% of mothers introduced complementary foods for their infants at the age of 4 months in Lebanon. There was a statistically significant association between mothers' employment status and the introduction of complementary foods at the right time to their infants (OR, 1.78, 95% CI 1.01- 3.13). In West Bengal, the researchers found that promoting exclusive breastfeeding and complementary feeding practices may prevent malnutrition among children (Das et al., 2013). Researchers reviewed the data of the household surveys conducted in Pakistan from 1999 to 2007. They found that the rates of complementary feeding practices among mothers were 36.3% (95% CI: 32.4 – 40.2) in Pakistan (Hanif, 2011). The results of studies in four African countries showed that literate mothers were more likely to introduce solid and semi-solid foods to the infants as compared to the illiterate women (OR: 3.55; 95% CI 1.05 – 12.02; P-value < 0.05) (Issaka et al., 2015). In India, the researchers found that about 26% of mothers did not have proper knowledge regarding complementary infant feeding (Mohmood et al., 2012). In Bangladesh, the researchers found that knowledge of mothers, cultural, and social factors were some of the key determinants that influenced appropriate complementary feeding practices among mothers (Saleh et al., 2014).

Chapter 3: Research Method

Research Design

A quantitative cross-sectional survey research design is one of the most appropriate research designs that researchers apply in the field of public health and social science (Frankfort-Nachmias & Nachmias, 2008). A cross-sectional survey research design is an observational study that is applied in natural research settings without manipulating the study environment (Frankfort-Nachmias & Nachmias, 2008). A cross-sectional survey design enables the researchers to collect data from their study participants at a single point in time and compare different risk factors and outcomes of interest at the population levels (Institute for Work and Health, 2015). Researchers conduct cross-sectional survey research design to plan effective and evidence-based public health programs and interventions. A cross-sectional survey design is an appropriate choice when the aims of the research study are descriptive. When the purpose of the survey research study is descriptive, researchers may define their research questions, but they may not intend to test their research hypotheses. In descriptive survey research studies, researchers oftentimes intend to measure the risk factors or prevalence of outcomes of interest among their study populations (Levin, 2006). Researchers also apply cross-sectional survey research studies to explore the relationships between different risk factors and outcomes of interest at the population levels. In a cross-sectional survey design, the researchers have the flexibility to draw a representative sample to generalize the results of their study to a population level as a whole. A cross-sectional survey design requires little time to complete and is relatively inexpensive intervention as compared with quasi and experimental research designs (Levin, 2006). However, a cross-sectional study design cannot prove cause and effect associations (Levin, 2006).

Researchers can measure multiple risk factors and outcomes of interest using a cross-sectional research survey design. The likelihood of loss to follow-up is minimized in cross-sectional designs because the researchers do not require to make any follow-up of their study participants (Levin, 2006). A cross-sectional design is an appropriate choice to explore the etiology of diseases and plan public health programs and interventions to foster a positive social change at the community levels (Levin, 2006).

A cross-sectional survey design was applied to determine the association between mothers' knowledge, attitudes, and practices regarding complementary infant feeding and malnutrition in children in Afghanistan. I applied a cross-sectional survey design because one of the purposes of my research study is descriptive (Levin, 2006). I also assessed the association between mothers' knowledge, attitudes, and practices regarding complementary infant feeding and malnutrition in children aged between 6 to 24 months in Afghanistan. Using a cross-sectional survey design enabled me to investigate multiple risk factors and outcomes (Frankfort-Nachmias & Nachmias, 2008). A cross-sectional survey design can be conducted over a shorter period of time and spending little resources as compared with experimental and quasi-research designs. Applying a cross-sectional research survey design may assist the Afghan Ministry of Health in reviewing its nutrition policies and strategies to plan and implement evidence-based nutrition interventions in Afghanistan (Creswell, 2013). Therefore, a cross-sectional study design was an appropriate choice to address the problem statement and research questions in this study.

Target Population

The target populations for this survey research study were mothers who had infants and young children aged between 6 to 24 months and living in Kabul Province in Afghanistan. At present, the Afghan Ministry of Health and its partners do not have access to valid and reliable population-level data because the government could not manage to conduct any population-level census during the past 3 decades in Afghanistan. The first Afghan population census was conducted in 1979 (University of Washington & Institute for the Health Metrics & Evaluation, 2016). After 1979, the governmental agencies have faced a chronic shortage of population-level data in Afghanistan. According to the health management information system department of Afghan Ministry of Health, pregnant women account for approximately 4% and mothers who have children aged between 6 to 24 months account for approximately 6% of the total population in Afghanistan (Ministry of Public Health of Afghanistan, 2014).

Sampling and Sampling Procedures

I used a mix of cluster sampling and systematic random sampling procedures to select my study participants in this quantitative cross-sectional survey research study. Applying a two-stage model, I used a cluster random sampling technique for the selection of the public hospitals operating in Kabul Province, followed by the systematic random sampling of study participants to ensure that heterogeneous grouping of study participants was included in my survey research study (Stat Trek, 2016).

More specifically, first, I divided all public hospitals operating in Kabul Province into five separate groups (clusters) of hospitals by geography, located in north, south, east, west, and central zones in Kabul Province. After dividing all hospitals into five different clusters (groups) given their geographic locations, I randomly selected 6 hospitals, 1 hospital from each of the four zones and 2 hospitals from the central zone in Kabul Province. I randomly selected 2 public hospitals in the central zone because of population density in the central zone in Kabul Province. After randomly selecting 6 hospitals in these five zones in Kabul Province, I used the systematic random sampling procedures to select my study participants within each randomly selected public hospitals operating in Kabul Province (Stat Trek, 2016). A systematic random sampling method is a probability sample design where a representative sample is drawn from the study participants (Frankfort-Nachmias & Nachmias, 2008). Figure 3 illustrates the graphic pathway of sampling.

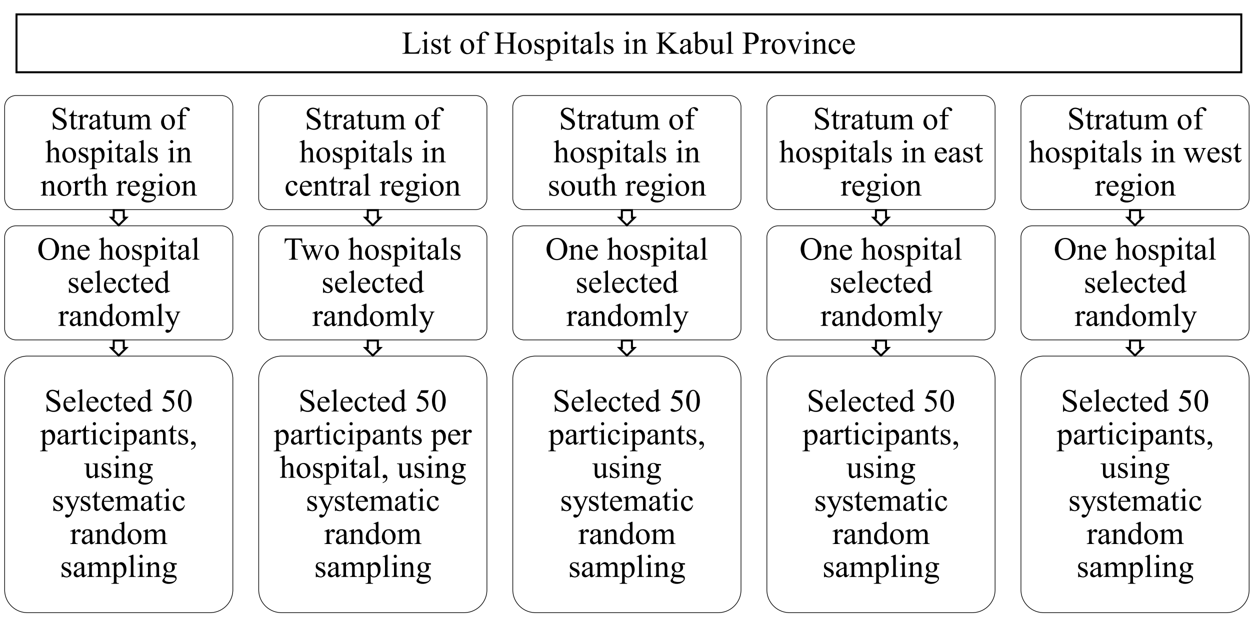

Figure 2. Sampling Pathway Complementary Feeding Practices.

The rationale for applying a mixed of cluster random sampling and systematic random sampling strategy in this survey research study included the following: (a) ensuring that natural and heterogeneous sample of study participants is obtained from the study population in Kabul Province; (b) obtaining more accurate and generalizable results given variations and representativeness of the study participants within the populations from which the sample will be drawn; (c) lack of access to a reliable list of populations in Afghanistan, the last population census was conducted in 1979 in Afghanistan. After 1979, the Afghan government did not conduct any population-level census. Therefore, I did not have access to the list of women of childbearing age in Afghanistan. d) I was able to access and select my study participants. Women can only be accessed at the hospital settings given social and cultural barriers they are facing in Afghanistan. e) Finally, it helped me select my sampling units, women who have a child aged between 6 to 24 months, from the population of women who live in Kabul Province in Afghanistan and collect valid and reliable information from my study participants. Therefore, a systematic sampling technique was an appropriate sampling strategy to guide my dissertation (Stat Trek, 2016).

It is worth mentioning that the hospital settings were preferred over the household setting to draw my sample and collect data from my study participants because women were hard to reach in the household settings in Afghanistan. It was culturally not acceptable for a male researcher to interview women in the household settings. Moreover, there is a widespread insecurity in Afghanistan. Therefore, it was not safe for the researchers to conduct interviews with women in the households and community settings in Afghanistan. Hospital settings are considered safe to conduct interviews with women in Afghanistan.

I used the Gpower software to calculate the sample size for this research survey. Using the Gpower, the calculated sample was approximately 278 women who have a child aged between 6 to 24 months. According to the Afghan Ministry of Health, on average, about 50 women who had a child aged between 6 to 24 months were attending each public hospital daily in Kabul Province to seek preventive and health-promoting maternal and child healthcare services (Ministry of Public Health of Afghanistan, 2016).

These 50 women or any total number of women who attended the randomly selected public hospitals constituted my study population (N) on a daily basis. To select a sample of (n) of women from the total of 50 women, I applied a systematic random sampling method to choose 10 study participants. Each woman who had a child aged 6 to 24 months was known to be the sampling unit in my study (Stat Trek, 2016).

To create a sampling fraction, the sampling fraction = n/N=300/50. According to the sampling fraction, I needed to select 1 in every 5 women who had a child aged between 6 to 24 months from the population of 50 women attending the selected public hospitals (Stat Trek, 2016). To select the first study participant, I needed to randomly select a woman who had a child aged between 6 to 24 months and had the frequency order from1 to 5 among the 50 listed women attending the randomly selected hospital in Kabul Province. Once the 1st study participant (sampling unit) was selected, I needed to select every 5th woman from the list of 50 women attending the hospital daily (Stat Trek, 2016). This exercise was repeated until I completed my interviews for the entire sample of 306 women.

To calculate the sample size for this research study, it is important to know the concept of power analysis. The term *power* is defined as the ability in order to find out that there is a statistically significant difference when a null hypothesis is false. *Power* is defined as the probability of correctly rejecting the null hypothesis in a research study (Sham & Purcell, 2014). To correctly reject the null hypothesis, it is important to determine the level of alpha, effect size and sample size appropriately (Sham & Purcell, 2014). Alpha which is also known as the probability of type one error, *type 1 error* is defined as the probability of falsely rejecting the null hypothesis given the fact that the null hypothesis is true (Sham & Purcell, 2014). The alpha level was set at 0.05 in my study. The effect size aims to determine the size of the difference in sample and population (Coe, 2002). The effect size was justified at 0.50 which was the large level of effect size for the chi square test and t-test on correlations (Coe, 2002). The larger the effect size is the simpler to find out the difference in population if such difference exists (Sham & Purcell, 2014).

Power is used to determine the number of participants or subjects in a study. In other words, the term *power* is applied in order to quantify the number of research participants that are needed to correctly answer the research questions. Therefore, power plays a very important role in determining the size of the sample in any research study. Power calculation depends on factors such level of precision, the level of certainty to reject null hypotheses, and type of the statistical tests that were applied in the analysis

(Jones, Carley & Harrison, 2003). The power was set at 0.8. The alpha level at 0.05, the effect size of 0.50 and power at 0.8 provided me with a robust sample size to answer the proposed research questions. Therefore, using power analysis to calculate a sample size for this study, I used Gpower software (Erdfelder et al., 1996). The following parameters were applied to calculate the sample size: Tails= 2, odds ratio =2.0, Pr H0 = 0.5, alpha level = 0.05, Power = 0.8, R^2 other factors (X) = 0, χ distribution = binomial, χ parm = .05. Given the above parameters, the total number of study participants required to measure the level of knowledge, attitudes, and practices among mothers for infant feeding was 278 However, I drew a sample of 306 participants in this research study to increase the generalizability of the findings of my research study (Erdfelder et al., 1996).

Procedures for Recruitment, Participation, and Data Collection

The study participants for this survey research study include the women who had their last child aged between 6 to 24 months. To recruit the study participants, I needed to obtain the list of the public hospitals operating in Kabul Province from the Afghan Ministry of Health. After obtaining the list of public hospitals, I randomly selected 6 public hospitals in Kabul Province. After randomly selecting the public hospitals in Kabul Province, the study participants were selected in each randomly selected public hospital based on applying systematic random sampling procedures. The inclusion criteria for the selection of each study participants were defined as a woman who had her last child aged between 6 to 24 months and lived in Kabul Province. Prior to starting the recruitment of study participants, I conducted an informational meeting with the directors of the hospitals to describe the purpose of my study. In consultation with the leadership of the hospitals, a separate room was identified inside the selected hospitals to conduct interviews with every study participant. To recruit the study participants, I was present in the registration room of the selected hospital at 8 o'clock in the morning and stayed there until completing the process of recruitments and interviews with all study participants. The rush hours in public hospitals in Kabul Provinces were from 9:00 am to 2:00 pm. I created the list of all women who had a child aged between 6 to 24 months at the registration rooms of each of the selected public hospitals in close consultation with the responsible nurse in the registration rooms. After creating the list of study participants, a systematic random sampling technique was applied to recruit each study participants for the interview (Stat Trek, 2016). I listed all mothers who meet the inclusion criteria. According to the health management information system department of the Afghan Ministry of Health, on average 40 to 50 mothers who meet the inclusion criteria visited public hospitals to seek preventive and health-promoting maternal and child health care services in Kabul Province (Ministry of Public Health of Afghanistan, 2016). Every day, I planned to interview 10 women who had their last child aged between 6 to 24 months in the selected hospital. To recruit each study participants, I created a sampling interval, I divided the total number of women who were listed and met the inclusion criteria by the number of women who were interviewed. I assumed that on the first day, 50 women who had a child aged between 6 to 24 months can be listed. I divided the total number of listed participant (50 women) by the total number of women who were interviewed each day (10 women) to calculate a sampling interval. For instance, 50/10=5. In total, 10 women were interviewed daily given the permissible security situation in Kabul. To recruit the first study participants, the first study participant was selected from the list of study participants who were assigned the numbers from 1 to 5. Once the first study participant was randomly selected, every 5th woman from the list was selected to complete 10 interviews daily (Sulaiman et al., 2015).

Applying the systematic sampling procedures allowed me to select the (N) number of study participants based on the number of women attended the registration room of the hospital(s) daily (Sulaiman et al., 2015). Assuming that the first study participant who was randomly selected was listed as the second women in the sampling list of 50 women, after recruiting the first study participant, I needed to select every 5th woman from the list to complete my interviews (Sulaiman et al., 2015). This exercise was repeated until I completed my interviews for the entire sample of the study participants.

The demographic data that were collected from the study participants include family size, the level of education of the study participants, the level of income of the study participants, gender, age, weight, and height of the children. Moreover, data were collected on the mid-upper arm circumference (MUAC) of each child, place of delivery of the child, and height and weight of the mothers. Informed consents were provided to the study participants in verbal and written forms. The informed consents were read out in one of the local languages namely Dari for each study participants while recruiting them for the interviews. Once the interview started, I as a researcher once again had read out the informed consent for each study participant and then, I obtained consent from each study participant to start the interview. I have read out the informed consent because the majority of women in Afghanistan have a low level of education (UNESCO, 2016).

Data were collected by conducting face-to-face interviews with every mother who was older than 18 years and had a child aged between 6 to 24 months in the public hospitals in Kabul Province. The inclusion criteria for the study participants stipulated to include the mothers, who were older than 18 years, had their last child aged between 6 to 24 months and lived in Kabul Province. The exclusion criteria stipulated to exclude the mothers who did not have any child aged between 6 to 18 months and did not live in Kabul Province (mothers who were guests and attended the hospitals were not included in this research survey). I interviewed each study participant and information was noted on the paper-based questionnaires for each study participant. At the end of the interview, each study participants was asked if she had had any questions regarding the process of the interview and the pattern of information which was collected. If the study participants had any question(s), I answered their questions. Prior to starting the interviews with each study participant, it was emphasized that each study participant was allowed to discontinue her interview at any time if she did not feel comfortable. At the end of the interview process, I thanked each study participant and informed her that the interview process was completed. In this cross-sectional survey research study, data were collected through planning and conducting the single point face-to-face interviews with each study participants. Therefore, no follow-up visits were required for the study participants. If any study participant decided to discontinue her interview, another eligible participant replaced her.

Instrumentation, Anthropometric Test Measures, and Operationalization of Constructs

Several studies have been conducted to determine the pattern of exclusive breastfeeding practices among mothers in Afghanistan (UNICEF & CSO, 2012).

However, there had not been any quantitative research study conducted to determine the association of mothers' knowledge, attitudes, and practices regarding complementary feeding and malnutrition in children in Afghanistan. The results of the systematic literature review showed that multiple cross-sectional survey studies have been conducted to assess the level of knowledge, attitudes, and practices of caregivers regarding complementary infant feeding practices in other poor and developing countries. However, most of these studies are descriptive and did not assess the patterns of complementary infant feeding practices based on the WHO's guiding principles for complementary feeding of the breastfed child (PAHO & WHO, 2001). This quantitative cross-sectional study is the first survey research study to assess the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding practices in accordance with the WHO's guiding principles for complementary feeding of the breastfed child in Afghanistan (PAHO & WHO, 2001).

To complete the process of instrumentation and operationalization of constructs, I developed my survey questionnaires based on the WHO's guiding principles for complementary feeding of the breastfed child. After developing my survey questionnaires, I conducted the field testing of my survey questionnaires including anthropometric test measures to validate the process of data collection and utilization. Adapting the survey questionnaires in compliance with the cultural needs of Afghanistan was done through pilot testing of the survey questionnaires and anthropometric test measures. After pilot testing of survey questionnaires, I had the questionnaires translated in Dari language by a formal translator in Afghanistan.

Pilot Testing of the Survey Questionnaires and Anthropometric Test Measures

The purpose of pilot testing of the survey questionnaires including anthropometric test measures wasto analyze if each research question and anthropometric test measures really measures what it was meant to measure, were the contents of the questionnaire (questions) and anthropometric test measures understood by each study participants, did the study participants interpret each research question and anthropometric test measures in a similar way as I do, did the questionnaire collect the same information that Iaimed to collect and whether the response choices were appropriately organized in the questionnaire (Loyal Marymount University, 2016). To pilot test the survey questionnaires including the anthropometric test measures, I exactly followed the same sampling methodology described in the methodology section of this research study. One public hospital was selected using a random sampling approach. After randomly selecting public hospitals, I applied a systematic random sampling method to select 10 mothers who had a child aged 6 to 24 months and attended the hospital to seek preventive and health promoting services. A consent form was read out to each study participant. The consents were obtained from all study participants prior to participating in the pilot testing of the survey questionnaires. After obtaining consents from each participant, I started interviewing each participant to complete the survey questionnaire. I collected information from each mother and her child aged 6 to 24 months during piloting testing of the questionnaires. The anthropometric test measures for each child aged 6 to 24 months were an integral part of the pilot testing of questionnaires of this maternal KAP survey. To complete pilot testing of my survey questionnaires, I selected a total of 10 participants in 1 randomly selected public hospital in Kabul Province. The participants who had been selected to participate in the pilot testing phase of the questionnaire were exactly similar to real survey participants because I have applied similar inclusion and exclusion criteria to select each study participants during the pilot testing of the survey questionnaire. In addition, in the pilot testing phase, I have followed the same sampling procedures described in the methodology section of this proposal.

Conducting Anthropometric Test Measures for Children Aged 6 -24 Months

To conduct the anthropometric test measures for the children aged between 6 to 24 months, the children age, weight measurements, and length or height measurements were recorded in this research study (WHO, 2008).

Age measurements. To record the age of each child participating in this maternal KAP survey, the mothers were asked to describe the exact age of their children. Then, the age of each child was verified in his/her vaccination card to ensure the accuracy of age for each child who had been included in this study. If the exact age of a child could not be determined, the child was excluded (WHO, 2008).

Weight measurements. To measure the weight of children aged between 6 to 24 months, I have used a taring scale. A taring scale was ready to reset to zero after measuring the weight of each mother while a mother could still remain on the scale holding her child and the weight of the child has appeared on the scale. Thus, using the taring scale reduced the risk of errors of subtraction while measuring the weight of the children in this study (WHO, 2008). I have used the UNISCALE (a taring scale recommended by the UNICEF) in this study. To measure the weight of a child aged less than 24 months, I asked each mother to step on the scale to measure her weight alone. After measuring the weight of the mother alone, the mother would still remain on the taring scale and the scale was reset to zero. Then, the mother was asked to hold her child. The weight of the child has appeared on the scale, and the child's weight was recorded (WHO, 2008). To measure the weight of a child aged 24 months, I have measured the weight of each child alone. The child standed on the scale and remained still. His/her weight was appeared on the scale. I recorded the weight of each child. It is worth mentioning that each child was undressed by removing their outer clothing and/or any ornaments during weight measurements (WHO, 2008).

Length or height measurements. To measure the length or height of children aged 6 to 24 months, I used the length board (infantometer) to measure the length of a child younger than 2 years in a lie-down position. I used a height board to measure the height of a child aged 24 months in a standing position. To measure the length of children who were less than 2 years of age, I used a length board by placing the child in a recumbent (lie-down) position and recorded his/her length (WHO, 2008). If a child was 2 years, I used a height board to measure his/her height in a standing position (WHO, 2008). The WHO recommends that the child's height in a standing position is 0.7 cm less than the length of a child in a recumbent position, therefore, adjustments were made accordingly during the height measurements of the children (WHO, 2008).

Plan to Provide Evidence for Reliability and Validity

My plan to provide evidence for reliability included conducting test-retest reliability, inter-rater reliability, and internal consistency reliability. The test-retest reliability aimed at ensuring consistent measurements of the study variables over time (Research Rundowns, 2009). I have assessed the test-retest reliability of my survey instruments by repeating the measurements of study variables with the same group of mothers who had children aged between 6 to 24 months and had been hospitalized in the pediatric unit of government hospitals at 2different points of time and compared the consistency of my results (Research Rundowns, 2009). To ensure the inter-rater-reliability, I have asked 2 different observers to complete the measurement of study variables. After completing the measurements of study variables by 2 different observers, I verified if the results of the 2 different measurements were reliable. The internal consistency reliability test of different items in my survey instruments has been assessed by measuring the Chronbach's Alpha (Research Rundowns, 2009).

My plan to provide evidence for the validity of my survey instruments included measuring the external validity, internal validity, content validity, construct validity, and predictive validity (Research Rundowns, 2009). The concept of internal validity focussed on evaluating the fact to what extent the changes in the dependent variables were correlated with the changes in the independent variables, but not with the extraneous variables (Trochim, 2006). Internal validity was ensured by controlling and adjusting the effects of all extraneous factors (Trochim, 2006). External validity has been ensured by selecting a representative sample to generalize the finding of this study at the population level. I planned to provide evidence for content validity by examining the fact that the questions and observations in survey instruments have addressed the purpose, the research questions, and hypotheses indicated in my survey research study (Trochim, 2006). The concept of content validity has been assessed by conducting a systematic review of literature sources and comparing the content of my survey instruments with the content of other survey instruments applied in similar studies. I also provided evidence for content validity by conducting field tests of my survey instruments to ensure the fact that the contents of the survey instruments would really measure what the research study aimed to measure (Trochim, 2006). I planned to provide evidence for construct validity by evaluating the fact that the questions in the survey instruments would address the proposed theories and their constructs (Trochim, 2006). The construct validity of the survey instruments was assessed by reviewing literature sources to assess how similar constructs are applied in other studies. In addition, during the field tests of the survey instruments, I have assessed if the questions in the survey instruments could operationally measure the constructs of the PAPM (Trochim, 2006).

Predictive validity of my survey instruments was evaluated by assessing the fact that how mothers' knowledge, attitudes, and practices regarding complementary infant feeding practices have been correlated with malnutrition in children. Predictive validity was assessed during field testing of the survey instruments and some preliminary analyses were conducted to assess the concept of predictive validity (Clause, 2016). Such correlations have not been yet assessed in other studies in Afghanistan. Therefore, this study played an important role in predicting the correlations between knowledge, attitudes, and practices of mothers about complementary infant feeding practices and malnutrition in children in Afghanistan (Clause, 2016).

To establish the sufficiency of instruments in my study, I have taken on the following measures: 1) I conducted a systematic search of literature sources to evaluate how various survey instruments had been applied in other studies addressing similar research questions. Moreover, I have assessed the outcomes produced as a result of using such instruments in other studies aiming at addressing similar research questions and problem statement. Had there been valid and reliable survey instruments existed and already used in previous studies, I would have modified and used them for my research study. 2) Such survey instruments are not available.Therefore, I developed my new survey instruments and conducted the pilot testing of my survey instruments to adapt my survey instruments to the cultural and social settings of Afghanistan. 3) I also translated my survey instruments in Dari language to establish sufficiency of my survey instruments (Sullivan, 2011).

Data Analysis Plan

My data analysis plan aimed to create a practical roadmap to help me guide the process of data organization, data analysis, and data interpretation for actions (Centers for Disease Control, 2013). Creating a practical data analysis plan was a time taking endeavor. However, creating a practical data analysis plan has resulted in producing reliable results in my study (CDC, 2013). The purpose of data analysis plan was to visualize a step by step plan to help me think critically with regard to what data I needed to collect for my study, how to clean and organize my data set for the purposes of data analysis, data interpretation, and using the results to guide evidence-based actions (CDC, 2013). Below is the diagrammatic illustration of data analysis plan for my study.

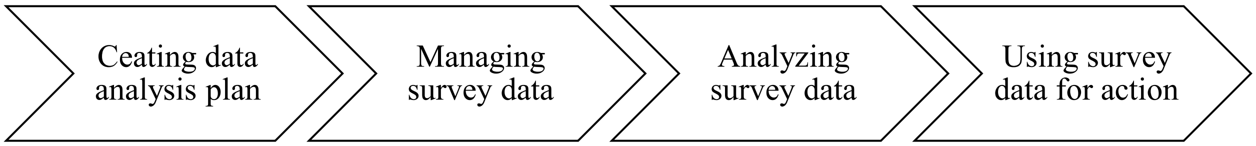

Figure 3. Data Analysis Plan Complementary Infant Feeding Practices in Afghanistan.

My data analysis plan is grounded in describing the following thematic areas:

1. Research questions and hypotheses
2. The statistical software that would be used to analyze the data
3. Data cleaning and data screening procedures
4. Statistical tests used to test the hypotheses
5. Procedures used to account for multiple statistical tests, as appropriate
6. Rationale for the inclusion of covariate and/or confounding variables
7. Ways to interpret the statistical results

Research Questions and Hypotheses

To establish a solid linkage between research questions and data analysis plan, once again, the proposed research questions and hypotheses are restated as below:

Question 1: What is the association between mothers' knowledge about complementary feeding and malnutrition in children?

H_{01}: There is no association between mothers' knowledge about complementary feeding and malnutrition in children.

H_{a1}: There is an association between mothers' knowledge about complementary feeding and malnutrition in children.

Question 2: What is the association between mothers' attitudes about complementary feeding and malnutrition in children?

H_{02}: There is no association between mothers' attitudes about complementary feeding and malnutrition in children.

H_{a2}: There is an association between mothers' attitudes about complementary feeding and malnutrition in children.

Question 3: What is the association between mothers' practices of complementary feeding and malnutrition in children?

H_{03}: There is no association between mothers' practices of complementary feeding and malnutrition in children.

H_{a3}: There is an association between mothers' practices of complementary feeding and malnutrition in children.

Statistical Software

I have used the Statistical Package for the Social Services (SPSS) software added version 22 and the WHO Anthro (version 2.2.3) and macros to analyze the data of this quantitative cross-sectional survey research study. The SPSS Statistical Software provides a user-friendly platform for data entry, data cleaning, and data analysis. Walden University recommends using this statistical software for analyzing quantitative data (Green and Salkind, 2014). The WHO Anthro (version 2.2.3) and macros will be used to analyse data related to anthropometric test measures in this cross-sectional research study (WHO, 2011).

Data Cleaning and Screening Procedures

Data cleaning and data screening are the processes of identifying and cleaning errors, faulty values, and missing values (Broeck, Cunningham, Eeckels, and Herbst, 2005). Data cleaning and screening are considered important error prevention strategies in my study because errors may occur despite thoughtful research design and operationalization. The purpose of data cleaning and screening procedures is to identify errors and prevent their effects on the results of my study (Broeck et al., 2005). Data cleaning and screening strategies have been implemented through using a phase wise approach namely diagnostic phase, documentation phase, and treatment phase. In diagnostic phase, I had applied data cleaning and screening strategies that enabled me to diagnose errors and missing values. In this phase, I have looked for identifying missing values, errors, true normal values, true extreme values, suspected values, and outliers in my data set. I have applied data validation procedures, browsing, sorting, and graphical exploration of variable distributions through running histogram, box plot, and scatter plots to look for missing values and errors. I have also run frequency distribution and cross-tabulation analyses to look for missing values and errors in my dataset (Broeck et al., 2005).

In the documentation phase, I had documented all missing values, errors, extreme values, and suspected values to edit and validate them in my data set. Transparent documentation of all errors, missing values, and extreme values were parts of data cleaning and screening procedures (Broeck et al., 2005). In the treatment phase, after identifying errors and missing values, I defined strategies to deal with errors, missing, and extreme values. The options for data cleaning and screening have been correcting the errors, detecting errors, and missing values or leaving them. I had conducted analyses with or without including missing data, errors, the extreme true and untrue values, and compare the results of analyses. Appropriate decisions were made following comparing the results of analyses given data set including errors and missing values and cleaned (Broeck et al., 2005).

Statistical Test Used to Test the Hypotheses

I have used a logistic regression and chi-square tests to test the hypotheses in this quantitative cross-sectional study. The key Independent Variables (IDs) are categorical (binary) variables. The IVs are defined as maternal knowledge, attitudes, and practices regarding complementary infant feeding practices in Afghanistan. The IVs are defined as mothers expressing knowledge, attitudes, and practices regarding complementary infant feeding which will be coded = (1). Mothers not expressing knowledge, attitudes, and practices regarding complementary infant feeding which will be coded =(0).The Dependent Variables (DVs) are also categorical (binary) variables. The DVs are defined as children aged between 6 to 24 months who are malnourished and not malnourished. Malnourished children will be coded = (1) and non-malnourished children will be coded = (0). Given the nature of IVs and DVs, I have used logistic regression and chi-square tests to test my research hypotheses (CDC, 2013).

Table 1

Research Questions, Related Variables, and Statistical Tests

Research Questions	Independent and Dependent Variables	Statistical Tests Used
Question 1: What is the association between mothers' knowledge about complementary feeding with malnutrition in children?	Independent variable: Binary variable - level of knowledge of mothers on complementary feeding practices, coded as mothers having no knowledge = (0) and mothers having knowledge = (1). Dependent variable: Binary variable - nutritional status of children aged 6 to 24 months, coded as malnourished children = (1) and not malnourished children = (0).	Statistical test(s): The chi square Test of Independence had been conducted to assess the level of significance between categorical variables. Then, the logistic regression models were used to test the research Question 1, null and alternative hypotheses for this research question.
Question 2: What is the association between mothers' attitudes about complementary feeding and malnutrition in children?	Independent variable: Binary variable - attitudes of mothers on complementary feeding practices, coded as mothers not expressing attitudes = (0) and mothers expressing attitudes = (1). Dependent variable: Binary variable - nutritional status of children aged 6 to 24 months, coded as malnourished children = (1) and not malnourished children = (0).	Statistical test(s): The chi-square test of independence had been conducted to assess the level of significance between categorical variables. Then, the logistic regression models were used to test the research question 2, null and alternative hypotheses for this research question.
Question 3: What is the association between mothers' practices of complementary feeding and malnutrition in children?	Independent variable: Binary variable – levels of practices of mothers on complementary feeding, coded as mothers not practicing complementary infant feeding = (0) and mothers practicing complementary infant feeding = (1). Dependent variable: Binary variable- nutritional status of children aged 6 to 24 months, coded as	Statistical test(s): The chi-square test of independence had been conducted to assess the level of significance between categorical variables. The logistic regression models were used to test the research question 3, null and alternative hypotheses for this research question.

	malnourished children = (1) and not malnourished children = (0).	

Procedures Used to Account for Multiple Statistical Tests

I planned to conduct some univariate analyses to explore the characteristics and patterns of study participants such as age, sex, weight, height, and level of education. The results of univariate analyses would be presented in the form of numbers, percentage, means or median of the continuous variables, and frequency distributions of the discrete variables. I have also conducted logistic regression analyses (bivariate analyses) to test my research hypotheses. In addition, I have applied logistic regression analyses to analyze the association between different independent (explanatory) and dependent (outcome) variables in my study (CDC, 2013). For example, I have used binary and logistic regression modeling to determine the association between mothers’ knowledge, attitudes, and practices about complementary feeding and malnutrition in children.

Therefore, after I had described the characteristics and patterns of my study populations and their subcategories, I conducted analyses to assess if there were statistically significant differences existed between my independent and dependent Variables. The defined variables in this cross-sectional study are categorical (dichotomous), therefore, I have used logistic regression and chi-square tests to assess the level of significance of the association between different variables (CDC, 2013).

Rationale for the Inclusion of Covariate and Confounding Variables

I included the covariates namely the level of education of mothers, and economic status of mothers. Educated mothers tended to have well-nourished children (Save the

Children, 2012). The economic status of study participants is likely to influence the nutritional status infants and young children (Ministry of Public Health of Afghanistan, 2012). I included the above-mentioned covariates because they may influence the association between explanatory and outcome variables in my study (CDC, 2013).

Ways to Interpret the Statistical Results

Determining which statistical tests the researchers should apply really depends on the type of variables, the study designs and if the data follows normal or skewed distributions (McCluskey & Lakken, 2013). Interpreting statistical results of my study depends on the types of variables, and the statistical tests that I have applied in my study. I interpreted my study results based on the considerations of the concepts of null and alternative hypotheses, the level of significance of *p* values, odds ratios, confidence intervals, and statistical versus social significance of the results in this study (McCluskey & Lakken, 2013). I have assessed the distributions of data in my study by constructing frequency and histogram curves. I interpreted the normality of distribution of data by using Shapiro–Wilkes test given the large sample size in this study, the Shapiro-Wilkes test was likely to be robust. The hypotheses testing are a very important step to assess if there are statistically significant differences between the measuring variables. Therefore, I interpreted the statistical results based on the defined cut-off rate of *P*-values (McCluskey & Lakken, 2013).

In addition to hypotheses testing and interpretation of results of *p* values, I have conducted logistic regression models to interpret the statistical results based on the underlying assumptions for the logistic regression models. The assumptions of the logistic regression model are linearity and multicollinearity, lack of outliers, and dichotomous nature of the outcome variables in this research study. To assess the assumption of linearity, I constructed a scatter plot for the standardized residuals and the standardized predicted values and observe if the scatter plot pattern is not curvilinear. Then the assumption of linearity is not violated (Field, 2013). To assess the assumption of multicollinearity, I have examined the variance inflation factor (VIF) values to assess no perfect multicollinearity for the independent variables in my study. If the VIF values for any independent variables are 10 or above. Then the assumption of no perfect multicollinearity is not violated (Field, 2013). To test the assumption of lack of missing values and dichotomous nature of outcome variable in this study, I have run the frequency analysis. After the assumptions for the logistic regression model are met. I have interpreted the statistical results based on chi-square test, *p* values and 95% confidence interval for all predictors in this study (McCluskey & Lakken, 2013).

Threats to Validity

Threats to validity are classified as the threats to internal validity and threats to external validity. The term external validity is defined as the approximation of truth of study results that can be generalized (Trochim, 2006). Some researchers believe that the concept of generalizability cannot be fully achieved (Campbell & Stanley, 1963).

However, generalizability can be improved by selecting a larger sample size that resulted in study participants demonstrating generalizability at the population levels in term of specific characteristics such as age groups, gender orientation, education status, socioeconomic status, and truth of the study results (Campbell & Stanley, 1963).

Some potential threats to external validity included testing reactivity, the interaction effects of selection and outcome variables, and reactive effects of experimental arrangements and multiple treatments. Threats to testing reactivity refer to the fact that how the responses of study participants are influenced while they participate in the study (Campbell & Stanley, 1963). This survey research study is observational in nature and was conducted in a natural setting. Therefore, testing reactivity was not a potential threat to affect the external validity of this survey research study (Campbell & Stanley, 1963). The interaction effects of selection and outcome variables are potential threats to external validity when nonprobability sampling strategy is applied. I had applied the principles of randomization while selecting my study participants. Therefore, the interaction effects of selection were not the potential threats (Campbell & Stanley, 1963). The interaction of experiment/treatment and selection of study participants were not potential threats to affect the external validity in my study because the interaction of experiment and selection of study participants are potential threats to external validity when convenience sampling procedures are applied. The random selection of study participants has ruled out the threat to external validity in my study (Campbell & Stanley, 1963). The interactions of intervention/experiment and research settings had not been potential threats to external validity because the study participants were diverse and belonged to different populations in the research settings in my study (Campbell & Stanley, 1963). The interaction of experiment/intervention and history were not a threat to external validity in this study because my study is a cross-sectional research study that was conducted at a single point in time (Campbell & Stanley, 1963.). Multiple treatments/intervention interactions are threats to external validity when interventions or treatments are applied to the same research participants. Multiple-treatment interference is not posing any threats to external validity in cross-sectional study designs (Campbell & Stanley, 1963).

The concept of *threats to internal validity* is defined as the extent to which the alteration in the dependent (outcome) variables is correlated with the independent (explanatory) variables rather than extraneous factors. Internal validity deals with the study setup and selection of the study participants (Campbell & Stanley, 1963). The term *internal validity* includes history, maturation, testing, instrumentation, statistical regression, experimental mortality, and interactions of selection and maturation (Campbell & Stanley, 1963). The term *history* refers to the occurrence of external events in addition to the independent variables between the first and second measurements in research studies. History was not a potential threat in this survey research study because the data collection interventions were completed at a single point in time (Campbell & Stanley, 1963). History poses threats to internal validity in longitudinal studies and research studies with repeated measurements (Campbell & Stanley, 1963). Maturation is another threat to internal validity (Campbell & Stanley, 1963). The term *maturation* refers to a process within which the alterations may occur in the study participants due to the passage of time rather than the independent variables. Maturation was not a potential threat in this cross-sectional survey research because the data collection process had been completed in a relatively shorter period of time (Campbell & Stanely, 1963).

Testing is a threat to internal validity when the same groups of study participants undergo the pre-test and post-test interventions and the results of the study are being influenced in a way that the study participants respond to the post-testing interventions. Testing is a potential threat in the research studies with repeated measurements and studies involved pre and posttest interventions (Campbell & Stanley, 1963).

Instrumentation is a potential threat to internal validity when changes may occur in the study instruments in certain ways that the questions are scored or information are gathered in the research instruments from the study participants. Instrumentation is a threat to internal validity in research studies when physiological instruments which are used for the data collection purposes are subjected to defects or changes. In this research study, I had used height boards and scales to measure the height and weight of the infants and young children. I made sure that instrumentation did not pose any threats to internal validity in this survey research study (Campbell & Stanley, 1963). Quality control measures were in place to avoid threats to internal validity due to instrumentation. In addition, prior to starting data collection, the intra-rater and inter-rater reliability have been measured and improved to avoid threats to internal validity due to instrumentation (Campbell & Stanley, 1963). Statistical regression is the potential threats to internal validity when the study participants are chosen on the basis of extreme scores or criteria.

Statistical regression is a potential threat to internal validity in studies that the researchers are using a convenience sampling strategy. In this research survey study, regression did not pose a threat to internal validity because of applying the principles of randomization (Campbell & Stanley, 1963). Experimental mortality is a threat to internal validity when there is a high dropout rate or loss to follow-up among the study participants. Experimental mortality was a threat to internal validity in this research study. Oftentimes, experimental mortality is a threat to internal validity in longitudinal studies (Campbell & Stanley, 1963). The differential selection is a threat to internal validity when the respondents in comparison or control groups are different in their characteristics from the respondents in the intervention groups. The differential selection was not a threat to internal validity in this study because there was only 1 group of study participants who had been selected based on using the principles of randomization (Campbell & Stanley, 1963). Selection-maturation interactions are threats to internal validity when the changes in the outcome variables are due to the extraneous factors or confounding variables. Selection-maturation is a threat to internal validity in quasi-experimental or study designs with multiple study groups (Campbell & Stanley, 1963). The selection-maturation interactions were not threats to internal validity in cross-sectional study designs because my research study included 1 group of study participants (Campbell & Stanley, 1963).

In this study, there was no threat to construct validity because the PAPM constructs are widely applied in other studies. In addition, the constructs were translated into measurable variables to measure it properly. The threats to conclusion validity are referred to the situations or factors that are likely to guide the researchers to reach incorrect conclusions in their research studies (Trochim, 2006). The threats to conclusion validity have been avoided by controlling the effects of confounding factors and extraneous variables in this research study. Quality control measures have been applied in the stages of design, implementation, and data analyses. In addition, using the principle of randomization resulted in controlling the threats to conclusion validity in my survey research study (Trochim, 2006).

Ethical Procedures

The term ethical procedures are defined as the set of norms and procedures that help the researchers analyze complex problems and phenomena in the field of research to comply with standard ethical procedures and norms (Resnik, 2015). I needed to comply with ethical norms and procedures in this survey research study given the following reasons: 1) ethical norms and procedures promote the use of authentic research knowledge and minimize potential errors in my research study. 2) Adhering to ethical norms and procedures promote collaborations and cooperation among different partners including researchers, research participants, research institutions, and stakeholders. Ethical norms and procedures result in establishing credibility and trust among all relevant stakeholders. 3) Respecting research norms and procedures promote the culture of data use, accountability, transparency, and respect for the study participants. 4) Compliance with research procedures and norms prevent researchers from committing conflict of interest, misconduct, harm to human subjects, and ensure human subject protection. 5) Complying with the ethical norms and procedures establishes credibility and trust between communities and the researchers, promote the concepts of integrity, and social values. 6) Finally, complying with the ethical norms and procedures promote the principles of voluntary participation, respect for the persons, beneficence, and justice (American Psychological Association, 2016). I obtained informed consents prior to starting the interviews with the study participants. I have also strictly complied with all ethical procedures and norms of Walden University (Walden University, 2015). As part of ethical procedures and norms, I needed to obtain the Institutional Review Board (IRB) approval from Walden University and the Afghan Ministry of Health to collect data from the study participants. The IRB's specific number for my study is 06-20-19-0465731 (Walden University, 2016).

The human subjects were treated with respect and justice. I had made sure that all human subjects especially the vulnerable groups were protected. The principles of beneficence and maleficence have been enacted in this research study (Walden University, 2016). Safety of each study participant had been ensured and all study participants were treated with dignity. The informed consent forms and research instrumentation have been customized to the level of comprehension and absorbability of the study participants in this research survey. To provide an extra level of protection, the study participants have been treated with anonymity and confidentiality. I had ensured that there was no harm to the study participants in this survey research study (Walden University, 2016).

The recruitment process of all study participants had been made on the basis of voluntary participation and informed consents were obtained from each study participant.

Describing the goal and objectives of this research study to every participant prior to starting the interview process constituted the foundation of recruitment processes. I personally have taken on the responsibility to create an environment which have not only been transparent but also ethical. The recruitment procedures have been in compliance with the principles of justice, respect, dignity, and voluntary participation. Moreover, privacy, confidentiality, and avoiding undue influence in the process of screening and recruitment of study participants have been ensured in this survey research study (University of California, 2012).

The process of collection of data from the study participants had been started after informed consents were obtained. Any ethical concerns related to data collection were dealt with in accordance with the principles of respect for the study participants, justice, beneficence, and nonmaleficence. I had explained to all study participants that their participation is voluntary and they have the right to withdraw the study at any point in time (Cash & Robin, 2016). In this cross-sectional study, if any of the study participants had refused to participate, she was excluded from the study. To address the concerns related to data collection, each study participants was briefed about the goals and objectives of this study. I had described to each study participants that there were no harm or adverse effects to them (Cash & Robin, 2016). I had made sure that data related to the human subjects were treated with sufficient level of caution and of security. The data were collected in paper-based questionnaires from each study participant. A guideline was developed to ensure the safety and security of the research data during data collection, processing, archiving and analysis. Human subject data were treated in accordance with the principles of anonymity and confidentiality. Adding the factor of de-identification during data collection, processing and archiving have reduced the potential risks and concerns related to security and safety of data. To ensure that the data are secured with the ultimate level of confidentiality, I avoided noting the identification (name and address of the study participants). Specific codes have been assigned to each questionnaire. All paper-based questionnaires had been locked in a secured box and no one had access to the research data (University of California, 2012). Once data collection process was completed. The data were entered into a computer and archived. After entering the data in a computer, strong passwords were assigned to all data files. A core control system had been established to ensure that the survey data were treated with appropriate confidentiality and anonymity (University of California, 2012).

The data were protected in accordance with the Walden University guideline. I strictly adhered to the guideline of the Walden University to protect the soft and hard copies of study questionnaires and data after completion of my doctoral dissertation in accordance with the recommended time period (Walden University, 2015). I made sure that all aspect of the ethical issues is in compliance with the principles of Institutional Review Board of the Walden University. Other ethical issues included but not limited to conducting my research study within my own work environment, conflict of interest, provision of incentives to study participants and power differential.

This study was not conducted in my own work environment. I did not have any conflict of interest. I did not provide any incentives to the study participants in this survey research study. The participation of all study participants has been on a voluntary basis.

Power differential did not act as a source of creating any constraints in this research survey study and I conducted my research study in the public hospital settings in Kabul Province in Afghanistan in accordance with the Walden University research guidelines (Gibson et al., 2014)

Summary

This chapter contained the descriptions of the research design (cross-sectional quantitative survey research study), target populations (mothers who have a child aged 6-24 months), the sample and sampling procedures, data collection procedures, instrumentation and operationalization of constructs, data analysis plan, threats to internal validity, external validity, and ethical procedures. The purpose of this research study is to determine the level of knowledge, attitudes, and practices of mothers regarding complementary infant feeding in Afghanistan. Therefore, this study adds to the body of literature to assist the Afghan Ministry of Health in addressing the gaps in nutrition policies and strategies to reduce malnutrition among children in Afghanistan.

Chapter 4: Results

Introduction

The purpose of this cross-sectional research study was to examine the association between mothers' knowledge, attitudes, and practices about complementary infant feeding and malnutrition in children in Afghanistan. I examined whether mothers' knowledge, attitudes, and practices about complementary feeding were significant predictors of chronic malnutrition (stunting) acute malnutrition (wasting), and underweight in children aged between 6 to 24 months in Afghanistan. Of particular interest was whether promoting appropriate complementary infant feeding practices at the community and household levels contributed in reducing malnutrition and its irreversible physical, mental, behavioral, and social consequence in children Afghanistan. To accomplish positive social change, I attempted to produce valid and reliable information on mothers' knowledge, attitudes, and practices regarding complementary infant feeding to assist the Afghan Ministry of Health and its stakeholders in making informed policy and program decisions. Moreover, the findings of this research study may be used to design and implement evidence-based nutrition education and behavior change interventions in Afghanistan to reduce the irreversible and long-lasting effects of malnutrition and influence a positive social change in communities in Afghanistan. I tested the following research questions and hypotheses:

Question 1: What is the association between mothers' knowledge about complementary feeding and malnutrition in children?

H_{01}: There is no association between mothers' knowledge about complementary feeding and malnutrition in children.

H_{a1}: There is an association between mothers' knowledge about complementary feeding and malnutrition in children.

Question 2: What is the association between mothers' attitudes about complementary feeding and malnutrition in children?

H_{02}: There is no association between mothers' attitudes about complementary feeding and malnutrition in children.

H_{a2}: There is an association between mothers' attitudes about complementary feeding and malnutrition in children.

Question 3: What is the association between mothers' practices of complementary feeding and malnutrition in children?

H_{03}: There is no association between mothers' practices of complementary feeding and malnutrition in children.

H_{a3}: There is an association between mothers' practices of complementary feeding and malnutrition in children.

Data Collection

The time frame for data collection was anticipated to be 5 to 6 weeks. The actual recruitment of study participants started during the first week of July 2017, and data collection was completed in the second week of August 2017. I interviewed each study participant after obtaining informed consent, and the response rate was 100%. There were no discrepancies in the paradigm of actual data collection from the anticipated data collection plan described in Chapter 3. I drew a sample from all women of childbearing age who accompanied by their children aged between 6 to 24 months in 6 randomly selected public hospitals in Kabul Province, Afghanistan. The sample was representative of the population of interest because I drew the sample from all women who accompanied by their children aged between 6 to 24 months in 6 public hospitals based on applying a combination of cluster sampling and systematic random sampling procedures. To ensure the generalizability of the sample to the population of interest, I obtained the list of public hospitals operating in Kabul Province from the Afghan Ministry of Health. After receiving the list of public hospitals, I divided all public hospitals into five clusters given their geographic locations (central, north, south, east, and west). I applied random sampling procedures and selected 1 public hospital from each cluster. I randomly picked 2 hospitals in the central region given the density of population in the central area. Within each randomly selected hospital, I applied systematic random sampling procedures to select the study participants. I used a combination of cluster sampling and systematic random sampling procedures, which ensured the generalizability of the sample to the population of interest in this research study (Stat Trek, 2016).

Pilot Survey of the Research Questionnaires and Anthropometric Test Measures

The purpose of piloting the survey questionnaire and anthropometric test measures was to evaluate the level of validity of survey questionnaires. I conducted a pilot testing of the research questionnaire and anthropometric test measures by drawing a sample of 25 mothers accompanied by their children aged between 6 to 24 months as compared to the actual large-scale survey, which included 306 mothers accompanied by their children aged between 6 to 24 months. I conducted the pilot survey of questionnaires and anthropometric test measures in one of the public hospitals operating in Kabul Province. During the pilot survey, I followed the same procedures indicated in the methodology section of this cross-sectional research survey. I randomly selected 1 public hospital operating in Kabul Province. After randomly selecting 1 public hospital, I applied a systematic random sampling approach to drawing a sample of 25 mothers accompanied by their children aged between 6 to 24 months. I obtained the consents from all 10 study participants who participated in the pilot survey. I interviewed each mother and conducted anthropometric test measures for each child aged between 6 to 24 months during the pilot survey. The summary results and effect of the pilot testing of the survey questionnaires and anthropometric test measures were as follows:

I evaluated the fact that the contents of the survey instrument were appropriate and understandable to each study participant who participated in the pilot survey. After completing interviews and anthropometric test measures in the pilot survey phase, I sought the opinions of all study participants about the process of study and administration of the questionnaires to the study participants. I modified survey questionnaire after obtaining feedback from each participant.

During the pilot survey, errors and skip patterns in survey questions were evaluated and modified that resulted in improving the quality of data collection in actual survey.

I evaluated the level of clarity and understanding of questions by each participant. Each study participants were asked to interpret 1 to 3 questions that were randomly picked from the list of questions in the research instrument.

Each study participant during the pilot survey was asked whether she came to feel comfortable to answer the research questions in survey questionnaires and/or whether the participants viewed some questions sensitive to be asked. Based on the feedback of participants participated in the pilot survey, the survey questionnaires were modified.

During the pilot survey, some problems including duplications of numbers in questions, repetition of questions and errors in wording were modified.

During the pilot survey, I evaluated different response options, for instance, single response questions, multiple response questions, and the inclusion of additional responses in the questionnaires.

During the pilot survey, I evaluated the level of intra-rater reliability for the anthropometric test measures conducted for each child aged between 6 to 24 months.

I evaluated the level of consistency of questions and how well different sections of the survey questionnaire were consistent. Also, I evaluated how much time is required to complete a single questionnaire. Thus, the level of consistency improved the paradigm of efficiency in the actual survey.

Finally, conducting the pilot survey of research questionnaire and anthropometric test measures have added to the credibility, validity, and reliability of the survey instrument and resulted in improving data collection quality in the actual survey.

Results of Pilot Testing of Survey Questionnaire

The results of pilot testing of the survey of questionnaires indicated that on average each family consisted of 6 members. On average, each family earned 166 USD per months. The average weight of children was 11 Kg, the average height of children was 71 centimeters, the average age of children was 14 months. Please see Table 2.

Table 2

Questionnaires Pilot Testing: Descriptive Statistics Socioeconomic Status of Families

Variables	*N*	Minimum	Maximum	Mean	*SD*
Family size	25	3	13	6	2.5
Family income ($US)	25	48	484	166	121
Children age (month)	25	6	24	14	6
Children weight (kg)	25	5	11	7.81	1.56
Children height (cm)	25	58	83	71	7

Table 3 demonstrated the results of pilot testing of survey questionnaires on mothers' knowledge about complementary infant feeding. The results indicated that 56 %, 95% CI (35 – 77) of mothers had appropriate knowledge about introducing complementary foods at the age of 6 months to children. About 24%, 95% CI (6 – 42) of mothers had knowledge about feeding children with nutritionally diverse foods, 40%, 95% CI (19 – 61) of mothers had knowledge about meal frequency in compliance with WHO's guideline. Moreover, 20%, 95% CI (3 – 37) of mothers had knowledge about children consuming vitamins and minerals and 48%, 95% CI (27 – 69) of mothers had knowledge about safe preparation of complementary foods in compliance with the WHO's guideline. Finally, 76%, 95% CI (58 – 94) of mothers had knowledge about feeding patterns during and after illnesses and 16%, 95% CI (1 – 31) of mothers had knowledge about responsive feeding in compliance with the WHO's guiding principles for complementary feeding of the breastfed child.

Table 3

Questionnaire Pilot Testing: Mothers' Knowledge About Complementary Infant Feeding

Mothers have knowledge	Percentage	95% CI for mother's knowledge	
		Lower	Upper
Right time to introduce complementary foods	56	35	77
Food diversity	24	6	42
Meal frequency	40	19	61
Safe preparation of complementary foods	48	27	69
Vitamin and mineral supplements	20	3	37
Feeding during after illness	76	58	94
Responsive feeding	16	1	31

Table 4 demonstrated the results of pilot testing of survey questionnaires on mothers' attitudes about complementary infant feeding. The results indicated that 72 %, 95% CI (53 – 91) of mothers expressed positive attitudes about introducing complementary foods at the age of 6 months to children. About 68%, 95% CI (48 – 88) of mothers expressed positive attitudes about feeding children nutritionally diverse foods, 44%, 95% CI (23 – 65) of mothers expressed positive attitudes about practicing meal frequency in compliance with the WHO's guideline. Moreover, 28%, 95% CI (9 – 47) of mothers expressed positive attitudes about consuming their children vitamins and minerals, and 48%, 95% CI (27 – 69) of mothers expressed positive attitudes about practicing safe preparation of complementary foods in compliance with the WHO's guideline. Finally, 84%, 95% CI (69 – 99) of mothers expressed positive attitudes about practicing feeding patterns during and after illnesses and 28%, 95% CI (9 – 48) of mothers expressed positive attitudes about practicing responsive feeding in compliance with the WHO's guiding principles for complementary feeding of the breastfed child.

Table 4

Questionnaires Pilot Testing: Mothers' Attitudes About Complementary Infant Feeding

Mothers express positive attitudes	Percentage	95% CI for mother's knowledge	
		Lower	Upper
Right age to introduce complementary foods	72	53	91
Food diversity	68	48	88
Meal frequency	44	23	65
Safe preparation of complementary foods	80	63	97
Vitamin and mineral supplements	28	9	47
Feeding during after illness	84	69	99
Responsive feeding	28	9	48

Table 5 demonstrated the results of pilot testing of survey questionnaires regarding mothers' practices about complementary infant feeding. The results revealed that 36 %, 95% CI (16 – 56) of mothers introduced complementary foods at the age of 6 months to children. About 8%, 95% CI (3 – 19) of mothers practiced nutritionally diverse foods, 32%, 95% CI (12 – 52) of mothers practiced meal frequency in compliance with the WHO's guideline. Moreover, 12%, 95% CI (2 – 26) of mothers practiced consuming their children vitamins and minerals and 16%, 95% CI (1 – 31) of mothers practiced safe preparation of complementary foods in compliance with the WHO's guideline. Finally, 68%, 95% CI (48 – 88) of mothers practiced feeding patterns during and after illnesses, and 12%, 95% CI (2 – 26) of mothers practiced responsive feeding in compliance with the WHO's guiding principles for complementary feeding of the breastfed child.

Table 5

Questionnaire Pilot Testing: Mothers' Practices of Complementary Infant Feeding

Mothers practice	Percentage	95% CI for mother's knowledge	
		Lower	Upper
Right age to introduce complementary foods	36	16	56
Food diversity	8	3	19
Meal frequency	32	12	52
Safe preparation of complementary foods	16	1	31
Vitamin and mineral supplements	12	2	26
Feeding during after illness	68	48	88
Responsive feeding	12	2	26

Table 6 demonstrated the results of pilot testing of survey questionnaires. The results revealed that 48 % of children aged 6 to 24 months were suffering from stunting whereas 28% of children were moderately stunted and 20% of children were severely stunted.

Table 6

Questionnaire PilotTtesting: Classification of Malnutrition for Height-for-Age on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	52
Moderately stunted	-3 < Z-score < -2	28
Severely stunted	Z-score < - 3	20

Table 7 demonstrated the results of pilot testing of survey questionnaires. The results indicated that 12 % of children aged 6 to 24 months were suffering from wasting whereas 8% of children were moderately wasted and 4% of children were severely wasted.

Table 7

Questionnaire Pilot Testing: Classification of Malnutrition for Weight-for-Height on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	88
Moderately wasted	-3 < Z-score < -2)	8
Severely wasted	Z-score < - 3	4

Table 8 demonstrated the results of piloting testing of survey questionnaires. The results indicated that 28 % of children aged between 6 to 24 months were underweight, 16% of children were moderately underweight and 12% of children were severely underweight. The results of piloting testing of survey questionnaires were consistent with the results of the complementary infant feeding practices research study in Afghanistan.

Table 8

Questionnaire Pilot Testing: Classification of Malnutrition for Weight-for-Age on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	72
Moderately underweight	-3 < Z-score < -2)	16

Severely underweight	Z-score < - 3	12

Study Findings

The results of this cross-sectional correlational research study are presented under the domains of univariate analysis, chi square test analysis, and logistic regression analysis to address the research questions and hypotheses. Descriptive statistics are presented under the domain of univariate analysis. The chi square test analysis was conducted to determine whether there was any correlation existed between predictor and outcome variables. The logistic regression analysis was conducted to determine not only the association between the predictor and outcome variables but also the strength of association between the predictor and outcome variables in this correlational cross-sectional study.

Univariate Analysis

The results of descriptive statistics indicated that a sample of 306 mothers accompanied by their children aged between 6 to 24 months was drawn from the population of interest by applying a combination of random sampling and systematic random sampling research methods. Data was gathered on mother's knowledge, attitudes, and practices about complementary infant feeding from 306 mothers who participated in this quantitative research study. Data was also gathered on the number of families, family's income and level of education of mothers, the age of mothers at the time of delivery, and age of children participated in the study. Moreover, anthropometric data were gathered from each child to determine the nutrition status of children.

The results of this cross-sectional study indicated that on average, each household had 6 members. The smallest family had 2 members including mothers and the index child (the mother was a widow and had 1 child) and the largest family size had 19 members. On average, each household earned 162 USD per months whereas the poorest family subsisted on 1 USD and the richest family subsisted on 769 USD a day in Afghanistan. The average weight of children was 12 Kg, the average height of children was 70 centimeters, the average age of children participated in this study was reported to be 13 months, and the average age of mothers at the time of delivering the index child was reported to be 26 years.

Table 9

Descriptive Statistics of the Variables Characterized the Sample in Complementary Infant Feeding Practices Study

Variables	*N*	Minimum	Maximum	Mean	*SD*
Family income ($US)	306	31	769	162.4	113.9
Children age (month)	306	6	24	13	5
Children weight (kg)	306	4	12	7.62	1.39
Children height (cm)	306	56	87	70	6
Mothers' age at the time of delivery of index child	306	17	43	26	6

Table 10 indicated that the overall level of knowledge of mothers about complementary infant feeding was low in Afghanistan. About 46 % of mothers did not have appropriate knowledge about introducing complementary foods at the right time.

The WHO recommended that complementary foods should be started at the age of 6 months for all children. Computing a 95% confidence interval for mothers' knowledge about the right time to introduce complementary foods, the study respondents 95% of times were confident to introduce complementary foods to children in compliance with the WHO's guidelines. Mothers' knowledge about introducing complementary foods at the right time was between 49 and 60 percent. The statistics showed that mothers' knowledge about the nutritionally diversified foods, use of vitamins and minerals, and responsive feeding was 19% with 95% CI (15-25), 15% with 95% CI (11-19)and 13% with 95% CI (10-17) respectively.

Table 10

Mothers' Knowledge About Complementary Infant Feeding

Mothers have knowledge	Percentage	95% CI for mother's knowledge	
		Lower	Upper
Right time to introduce complementary foods	54	49	60
Food diversity	19	15	24
Meal frequency	37	32	43
Safe preparation of complementary foods	51	45	57
Vitamin and mineral supplements	15	11	19
Feeding during after illness	78	73	83

Responsive feeding	13	10	17

Table 11 indicated that mothers' levels of expressing positive attitudes about complementary infant feeding were higher than mothers' knowledge and practices in Afghanistan. Mothers' positive attitudes about complementary infant feeding was an indication of the fact that advancing the level of knowledge of mothers would result in promoting appropriate complementary infant feeding practices in Afghanistan. The statistics on mothers' attitudes about complementary infant feeding indicated that 81% with 95% CI (77-85) of study respondents expressed positive attitudes about feeding patterns during and after illnesses, 78% with 95% CI (74-83) of study respondents expressed positive attitudes about introducing complementary foods at the age of 6 months to their children. Mothers' attitudes about vitamins and mineral supplements and responsive feeding were low, 27% with 95% CI (21-31) and 34% with 95% CI (29-29) respectively.

Table 11

Mothers' Attitudes About Complementary Infant Feeding

Mothers express positive attitudes	Percentage	95% CIfor mother's knowledge	
		Lower	Upper
Right age to introduce complementary foods	78	74	83
Food diversity	59	53	64
Meal frequency	45	39	51
Safe preparation of complementary foods	78	73	82

Vitamin and mineral supplements	27	21	31
Feeding during after illness	81	77	85
Responsive feeding	34	29	39

Table 12 indicated that mothers' practices of complementary feeding were lower than mothers' knowledge and attitudes about complementary infant feeding. Specifically, about 10% with 95% CI (6-13), 11% with 95% CI (8-15) and 14% with 95% CI (10-18) practiced food diversity, responsive feeding and consuming vitamin and minerals by their children in Afghanistan. Data on mothers' practices of complementary infant feeding indicated that the Afghan Ministry of Health needs to implement health education and awareness raising programs to promote appropriate complementary feeding practices among mothers in Afghanistan.

Table 12

Mothers' Practices of Complementary Infant Feeding

Mothers practice	Percentage	95% CI for mother's knowledge	
		Lower	Upper
Right age to introduce complementary foods	46	41	52
Food diversity	10	6	13
Meal frequency	28	23	33
Safe preparation of complementary foods	15	11	19
Vitamin and mineral supplements	14	10	18
Feeding during after illness	75	70	79

Responsive feeding	11	8	15

Table 13 indicated the prevalence of chronic malnutrition (stunting) among children aged between 6 to 24 months in Afghanistan. The results of this cross-sectional research study revealed that overall, 51% of children aged between 6 to 24 months suffered from chronic malnutrition (stunting), 29 % of children aged between 6 to 24 months suffered from moderate chronic malnutrition and, and 22 % suffered from severe chronic malnutrition (stunting) in Afghanistan.

Table 13

Classification of Malnutrition for Height-for-Age on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	49
Moderately stunted	-3 < Z-score < -2	28.8
Severely stunted	Z-score < - 3	22.2

Table 14 indicated the prevalence of acute malnutrition (wasting) among children aged between 6 to 24 months in Afghanistan. The findings of this cross-sectional research study revealed that overall, 14% of the children suffered from acute malnutrition, 8% of children suffered from moderate acute malnutrition (wasting), and 6 % of children suffered from severe acute malnutrition (wasting) in Afghanistan.

Table 14

Classification of Malnutrition for Weight- for-Height on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	85.6
Moderately wasted	-3 < Z-score < -2)	8.5
Severely wasted	Z-score < - 3	5.9

Table 15 indicated the prevalence of underweight among children aged between 6 to 24 months in Afghanistan. The results revealed that 29% of children aged between 6 to 24 months experienced underweight, 15% of children experienced moderate underweight and 14% of children experienced severe underweight in Afghanistan.

Table 15

Classification of Malnutrition for Weight-for-Age on Z Scores

Classification	Z-score values	Percentage
Adequate	-2 < Z-score < +2	70.9
Moderately underweight	-3 < Z-score < -2)	14.7
Severely underweight	Z-score < - 3	14.4

As indicated above, malnutrition is classified as an acute malnutrition (wasting), chronic malnutrition (stunting), and underweight (WHO & UNICEF, 2009). UNICEF and the WHO recommended studying stunting, wasting, and underweight to determine the nutritional status of infants and children. To assess the condition of stunting, wasting and, underweight in children, I needed to measure weight for height, height for age and weight for age in Z score (WHO & UNICEF, 2009). Weight for height is a measure of acute malnutrition or wasting in children. The weight for height indicator is applied to assess whether a child can be classified as an acutely malnourished (wasted) or not. Wasting is an indication of a child being thinner for his/her height. Wasting also indicates a pattern of recent nutritional deficiency in a child. Therefore, wasting increases the risks of morbidity and mortality in children (UNICEF & CSO, 2012).

Height for age is a measure of chronic malnutrition (stunting) in children. Height for age is applied to assess if a child can be classified as a chronically malnourished (stunted) or not. A stunted child is considered shorter for his/her age. Stunting is an indication of mothers' failure to practice appropriate complementary infant feeding over an extended period. Moreover, stunting increases the recurrence of chronic illnesses among children (UNICEF & CSO, 2012). And finally, weight for age is a measure of both acute and chronic malnutrition in children. It is an indication that a child is thinner for his/her age. It is applied to assess if a child can be classified as underweight or not. Clinicians measure weight for age of children to monitor their growth on a continuous base (UNICEF & CSO, 2012).

Given the magnitudes of malnutrition and its negative consequences among children in Afghanistan, I included stunting, wasting, and underweight as separate variables in my analyses. First, I run statistical tests to determine the association between mothers' knowledge, attitudes, and practices about complementary infant feeding and chronic malnutrition (stunting) in children. I also run statistical tests to determine the association between mothers' knowledge, attitudes, and practices about complementary infant feeding and acute malnutrition (wasting) in children. Finally, I run statistical tests to determine the association between mothers' knowledge, attitudes, and practices about complementary infant feeding and underweight in children. As such, the results of this research study would exhibit a comprehensive picture to determine whether mothers' knowledge, attitudes, and practices of complementary infant feeding are statistically significant predictors of stunting, wasting and underweight in children in Afghanistan.

Thus, not the results only would help the Afghan Ministry of Health and its stakeholder make inform policy and program decisions at the central level but the results would also help them to address the problem of malnutrition at the grassroots and community levels in Afghanistan. In the household survey which was conducted by the UNICEF in Afghanistan, I also studied the prevalence of stunting, wasting, and underweight in children in Afghanistan (UNICEF & CSO, 2012).

Chi-Square Test Analysis

When a chi square test is applied in any research studies, it is essential to make sure that the explanatory (independent) and response (dependent) variables must be measured at categorical data. The measuring variables must comprise of 2 or more categories. I used a chi square test as such that their data meet these 2 criteria (Field, 2013). Applying a chi square test is appropriate in this research study because my predictor and response variables are measured at categorical (nominal) levels. My first predictor variable is measured at a nominal level and defined as the level of mothers' knowledge about complementary infant feeding. My first predictor variable is coded as mothers having no knowledge = (0) and mothers having knowledge = (1). My second predictor variable is also measured at a nominal level and defined as the level of attitudes of mothers about complementary infant feeding. My second variable is coded as mothers not expressing attitudes = (0) and mothers expressing attitudes = (1). My third predictor variable is also measured at a nominal level and defined as the level of practices of mothers about complementary infant feeding. My third variable is coded as mothers not practicing complementary infant feeding = (0) and mothers practicing complementary infant feeding = (1). Moreover, my response variable is measured at a nominal level and defined as the nutritional status of children aged 6 to 24 months. My response variable is coded as malnourished children = (1) and not malnourished children = (0). Thus, I applied a chi square test to determine whether there are associations between my predictor and response variables in this research study (Field, 2013).

A chi square test was conducted to determine whether there were statistically significant associations between mothers' knowledge, attitudes, and practices of complementary infant feeding and malnutrition in children (Green & Salkind, 2011).

The WHO's guiding principles for complementary infant feeding of the breastfed child are defined as 1: Age of introduction of complementary foods, 2:Food diversity, 3: Meal frequency, 4: Safe preparation of complementary foods, 5: Use of vitamins and mineral supplements, 6: Complementary feeding during and after illnesses, and 7: Responsive feeding (PAHO & WHO, 2001).

The independent variables (IV) were defined as mothers' knowledge, attitudes, and practices of complementary infant feeding. The categories were defined as mothers had the knowledge or did not have the knowledge about complementary infant feeding, mothers expressed positive attitudes or did not express positive attitudes to practice complementary feeding and, mothers practiced complementary feeding or did not practice complementary infant feeding. Whereas, the dependent variable (DV) was defined as the nutritional status of children aged between 6 to 24 months. The categories were defined as malnourished or not malnourished.

Underlying Assumptions of The Chi Square Goodness of Fit Test

There are 3 key underlying assumptions for the chi test for independence. 1: The sample of the study participants needs to be randomly drawn from the study population. 2: The independent and dependent variables must be categorical. They must have 2 or more categories and the values for the independent and dependent variables must be mutually exclusive. 3: There must be a minimum of 5 occurrences in each category of expected counts. The underlying assumptions of the chi square test are met in this cross-sectional quantitative study. All study participants were randomly drawn from the population at 6 public hospitals in Kabul Province in Afghanistan. This assumption is important because the results of this cross-sectional research study need to be generalized to the population. The independent and dependent variables are categorical and values for the independent and dependent variables are mutually exclusive. Finally, the results of the chi square tests for independents indicated that zero cells of the tables of chi square test for independence had the expected values less than 5. Thus all the underlying assumptions of the chi-square test for independence have met in this cross-sectional quantitative research study (Green & Salkind, 2011).

Mothers' Knowledge about Complementary Infant Feeding and Malnutrition

The results of the chi-square test for independence indicated that there was a statistically significant association between mothers' knowledge of introducing complementary foods to children aged between 6 to 24 months and chronic malnutrition (stunting), $\chi2$ (1, $N = 306$) = 9.79, $p = .002$. As illustrated in Table 9, chronic malnutrition (stunting) was statistically significantly higher among children whose mothers did not have knowledge about introducing complementary foods in compliance with the WHO's guidelines. Specifically, only 43% of children whose mothers had knowledge about introducing complementary foods at the right time were malnourished, while this figure was 61% among children whose mothers did not have knowledge about introducing complementary foods at the right time. The Cramer's V= 0.20 which indicated that mothers' knowledge about introducing complementary foods at the right time had a small effect size on chronic malnutrition (stunting) in children. Moreover, the results of chi-square test indicated that there was a statistically significant association between mothers' knowledge about introducing complementary foods at the right time and underweight, $\chi2$ (1, $N = 306$) = 13, $p = 0.001$. The results of this research study revealed that 39 % of children whose mothers did not have knowledge about introduce complementary foods at the right time to their children were underweight than 21% of children whose mothers had knowledge about introducing complementary foods at the right time to their children. Whereas, there was no statistically significant association between mothers' knowledge about introducing complementary foods at the right time and wasting, $\chi 2$ (1, N = 306) = 0.374, p = .054. The results of this study revealed that 16% of children whose mothers had knowledge about introducing complementary foods at the right time were suffering from wasting than 13% of children whose mothers did not have knowledge about introducing complementary foods at the right time to their children.

Table 16

Malnutrition and Mothers' Knowledge About Right Age to Introduce Complementary Foods

	Have knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			9.79	.002	0.20
Yes	42.8%	60.7%			
No	57.2%	39.3%			
Total	100%	100%			
Wasted			0.374	0.541	0.035
Yes	13.3%	15.7%			
No	86.7	84.3			
Total	100%	100%			
Underweight			13.0	.001	0.21
Yes	20.5%	39.3%			
Not	79.5%	60.7%			
Total	100%	100%			

The results of chi-square test indicated that there was a statistically significant association between mothers' knowledge about nutritionally diversified foods and chronic malnutrition (stunting), $\chi 2$ (1, N = 306) = 12.3, p = 0.001. The study results revealed that significantly more children (56%) whose mothers did not have knowledge about nutritionally diversified foods were stunted than (31%) children whose mothers had knowledge about nutritionally diversified foods. The Cramer's V= 0.20 which indicated that mothers' knowledge about feeding children nutritionally diverse foods had small effect size on chronic malnutrition (stunting) in children in Afghanistan. However, there was no statistically significant association between mothers' knowledge about nutritionally diverse foods and underweight, $\chi2$ (1, N = 306) = 3.86, p = .05. The results revealed that 32% of children whose mothers did not have knowledge about nutritionally diversified foods as compared to 19% of children whose mothers had knowledge about nutritionally diversified foods were underweight. There was also no statistically significant association between mothers' knowledge about nutritionally diversified foods and acute malnutrition (wasting), $\chi2$ (1, N = 306) = 1.22, p = .305. The results of this study revealed that 10 % of children whose mothers had knowledge about nutritionally diversified foods as compared to 15% of children whose mothers did not have knowledge about nutritionally diversified foods were suffering from wasting.

Table 17

Malnutrition and Mothers' Knowledge About Nutritionally Diverse Foods

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			12.3	.001	0.20
Yes	30.5%	55.9%			
No	69.5%	44.1%			
Total	100%	100%			
Wasted			1.22	.305	0.06
Yes	10.2%	15.4%			

No	89.8	84.6			
Total	100%	100%			
Underweight			3.86	.049	0.11
Yes	18.6%	31.6%			
Not	81.4%	68.4%			
Total	100%	100%			

There was a statistically significant association between mothers' knowledge about meal frequency and chronic malnutrition (stunting), $\chi2$ (1, N = 306) = 16.4, p = .001. The results in Tables 11 indicated that significantly more children (60 %) whose mothers did not have knowledge about meal frequencies were stunted than (36 %) children whose mothers had knowledge about meal frequencies. The Cramer's V= 0.23 which indicated that mothers' knowledge about meal frequency had a medium effect size on chronic malnutrition (stunting) in children. The results of this research study revealed that there was also a statistically significant association between mothers' knowledge about meal frequency and underweight), $\chi2$ (1, N = 306) = 11.7, p = 0.001. The results indicated that 36% of children whose mothers did not have knowledge about meal frequency as compared to 18% of children whose mothers had knowledge about meal frequency were underweight. However, there was no statistically significant association between mothers' knowledge about meal frequency and wasting, $\chi2$ (1, N = 306) = 1.31, p = .253. The results of this study revealed that 11% of children whose mothers had knowledge about meal frequency as compared to 16% of children whose mothers did not have knowledge about meal frequency were suffering from wasting.

Table 18

Malnutrition and Mothers' Knowledge About Meal Frequency

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			16.4	.001	0.23
Yes	36.0%	59.9%			
No	64.0%	44.1%			
Total	100%	100%			
Wasted			1.31	0.253	0.07
Yes	11.4%	16.1%			
No	88.6	83.9			
Total	100%	100%			
Underweight			11.7	.001	0.19
Yes	17.5%	35.9%			
Not	82.5%	64.1%			
Total	100%	100%			

There was a statistically significant association between mothers' knowledge about safe preparation of complementary foods and chronic malnutrition (stunting), $\chi2$ (1, N = 306) = 8.22, p = .004. Significantly more mothers who did not have knowledge about safe preparation of complementary foods (59 %) had children who were chronically malnourished than mothers who had knowledge about safe preparation of complementary foods (43%). The Cramer's V= 0.23 which indicated that mothers' knowledge about safe preparation of complementary foods had medium effect size on chronic malnutrition (stunting) in children in Afghanistan. There was also a statistically significant association between mothers' knowledge about safe preparation of complementary foods and underweight, $\chi2$ (1, N = 306) = 8.20, p = 0.004. The results indicated that 37% of children whose mothers did not have knowledge about safe preparation of complementary foods as compared to 22% of children whose mothers had knowledge about safe preparation of complementary foods were underweight. However, there was no statistically significant association between mothers' knowledge about safe preparation of complementary foods and wasting, $\chi 2$ (1, *N* = 306) = 3.13, *p* = .077. The results of this study revealed that 11 % of children whose mothers had knowledge about safe preparation of complementary foods as compared to 18% of children whose mothers did not have knowledge about safe preparation of complementary foods were suffering from wasting.

Table 19

Malnutrition and Mothers' Knowledge About Safe Preparation of Complementary Foods

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			8.22	.004	0.23
Yes	42.9%	59.3%			
No	57.1%	40.7%			
Total	100%	100%			
Wasted			3.13	0.077	0.10
Yes	10.9%	18.0%			
No	89.1%	82.0%			
Total	100%	100%			
Underweight			8.20	.004	0.16
Yes	21.8%	36.7%			
Not	78.2%	63.3%			
Total	100%	100%			

There was no statistically significant association between mothers' knowledge about the use of vitamin and mineral supplements and chronic malnutrition (stunting), $\chi 2$ (1, $N = 306$) = 0.216, $p = .642$. The results of this research study revealed that mothers who did not have the knowledge about the use of vitamin and mineral supplements (52%) did not have children who were chronically malnourished than mothers who had knowledge about the use of vitamin and mineral supplements (48%). There was also no statistically significant association between mothers' knowledge about the use of vitamin and mineral supplements and acute malnutrition (wasting), $\chi 2$ (1, $N = 306$) = 1.18, $p = .277$. The results of this study indicated that 20% of children whose mothers had knowledge about vitamins and minerals as compared to 14% of children whose mothers did not have knowledge about vitamins and minerals were suffering from wasting. Moreover, the study concluded that there was no statistically significant association between mothers' knowledge about the use of vitamin and mineral supplements and underweight, $\chi 2$ (1, $N = 306$) = 3.59, $p = .058$ The results of this study indicated that 17% of children whose mothers had knowledge about vitamins and minerals as compared to 31% of children whose mothers did not have knowledge about vitamins and minerals were underweight. Therefore, I failed to reject the null hypothesis.

Table 20

Malnutrition and Mothers' Knowledge About Using Vitamins and Minerals

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			0.216	0.642	0.03
Yes	47.8%	51.5%			
No	52.2%	48.5%			

Total	100%	100%			
Wasted			1.18	0.277	0.06
Yes	19.6%	13.5. %			
No	80.4%	86.5%			
Total	100%	100%			
Underweight			3.59	.058	0.11
Yes	17.4%	31.2%			
Not	82.6%	68.8%			
Total	100%	100%			

The results of this research study showed that there was no statistically significant association between mothers' knowledge about feeding patterns during and after illnesses and chronic malnutrition (stunting), $\chi2$ (1, N = 306) = 3.58, p = .0.058. The results indicated that 61% of children whose mothers did not have knowledge about feeding patterns during and after illnesses as compared to 48% of children whose mothers had knowledge about feeding patterns during and after illnesses were stunted. There was also no statistically significant association between mothers' knowledge about feeding patterns during and after illnesses and wasting, $\chi2$ (1, N = 306) = 0.021, p = .885. The results of this study indicated that 14% of children whose mothers had knowledge about feeding patterns during and after illnesses as compared to 15% of children whose mothers did not have knowledge about feeding patterns during and after illnesses were suffering from wasting. Moreover, the study concluded that there was no statistically significant association between mothers' knowledge about feeding patterns during and after illnesses and underweight, $\chi2$ (1, N = 306) = 0.024, p = .876 The results of this study indicated that 29% of children whose mothers had knowledge about feeding patterns during and after illnesses as compared to 30% of children whose mothers did not have knowledge about feeding patterns during and after illnesses were underweight. Therefore, I failed to reject the null hypotheses.

Table 21

Malnutrition and Mothers' Knowledge About Feeding Patterns During and After Illnesses

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			3.58	0.058	0.11
Yes	48.1%	61.2%			
No	51.9%	38.8%			
Total	100%	100%			
Wasted			0.021	0.885	0.01
Yes	14.2%	14.9%			
No	85.8%	85.1%			
Total	100%	100%			
Underweight			0.024	0.876	0.01
Yes	28.9%	29.9%			
Not	71.1%	70.1%			
Total	100%	100%			

There was a statistically significant association between mothers' knowledge about responsive feeding and chronic malnutrition (stunting), $\chi 2$ (1, N = 306) = 13.4, p = .001. Significantly more mothers who did not have knowledge about responsive feeding (55%) had children who were chronically malnourished than mothers who had knowledge about responsive feeding (24%). The Cramer's V= 0.21 which indicated that mothers' knowledge about responsive feeding had a medium effect size on stunting in children in Afghanistan. There was also a statistically significant association between mothers' knowledge about responsive feeding and underweight), $\chi2$ (1, N = 306) = 8.56, p = 0.003. The results indicated that 32% of children whose mothers did not have knowledge about responsive feeding as compared to 10% of children whose mothers had knowledge about responsive feeding were underweight. However, there was no statistically significant association between mothers' knowledge about responsive feeding and wasting, $\chi2$ (1, N = 306) = 1.92, p = .166.

Table 22

Malnutrition and Mothers' Knowledge About Responsive Feeding

	Have Knowledge	Do not have knowledge	Chi square value	P value	Cramer's V
Stunted			13.4	0.001	0.21
Yes	24.4%	55.1%			
No	75.6%	44.9%			
Total	100%	100%			
Wasted			1.92	0.166	0.08
Yes	7.3%	15.5%			
No	92.7%	84.5%			
Total	100%	100%			
Underweight			8.56	0.003	0.17
Yes	9.8%	32.1%			
Not	90.2%	67.9%			
Total	100%	100%			

Mothers' Attitudes about Complementary Infant Feeding and Malnutrition

The results of chi-square test indicated that there was not a statistically significant association between mothers' attitudes about introducing complementary food to children at the right time and stunting, $\chi 2$ (1, N = 306) = 2.23, p = .137. Stunting was not statistically significantly higher among children whose mothers did not express positive attitudes to introduce complementary foods to children at the right time (59%) than children whose mothers expressed positive attitudes to introduce complementary foods to children at the right time (49%). However, the results indicated that there was a statistically significant association between mothers' attitudes about introducing complementary foods and wasting, $\chi 2$ (1, N = 306) = 8.85, p =.003 and underweight, $\chi 2$ (1, N = 306) = 9.00, p = .003. As illustrated in Table 16, wasting was statistically significantly higher among children whose mothers did not express positive attitudes about introducing complementary foods to children at right time (26%) than children whose mothers expressed positive attitudes to introduce complementary foods to children at right time (11%). The results also showed that underweight was statistically significantly higher among children whose mothers did not express positive attitudes to introduce complementary foods to children (44%) than children whose mothers expressed positive attitudes to introduce complementary foods to children (25%).

Table 23

Malnutrition and Mothers' Attitudes About the Right Age to Introduce Complementary Foods

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			2.23	0.137	0.09
Yes	48.8%	59.1%			
No	51.2%	40.9%			

Total	100%	100%			
Wasted			8.85	0.003	0.17
Yes	11.2%	25.8%			
No	88.8%	74.2%			
Total	100%	100%			
Underweight			9.00	0.003	0.17
Yes	25.0%	43.9%			
Not	75.0%	56.1%			
Total	100%	100%			

The results of the chi-square test indicated that there was a statistically significant association between mothers' attitudes about feeding children nutritionally diverse foods and stunting, $\chi 2$ (1, N = 306) = 4.62, p = .032. Stunting was statistically significantly higher among children whose mothers did not express positive attitudes about nutritionally diverse foods (58%) than children whose mothers expressed positive attitudes about nutritionally diverse foods (46%). The results also indicated that there was a statistically significant association between mothers' attitudes about feeding children nutritionally diverse foods and underweight, $\chi 2$ (1, N = 306) = 9.5, p = 0.002. The results of this research study showed that 39% of children whose mothers did not express positive attitudes about feeding children nutritionally diverse foods were underweight than 22% of children whose mothers expressed positive attitudes about feeding children nutritionally diverse foods. On the contrary, there was no statistically significant association between mothers' attitudes about feeding children nutritionally diverse foods and wasting, $\chi 2$ (1, N = 306) = 2.46, p = .117. The results of this study revealed that only 12 % of children whose mothers expressed positive attitudes about feeding children nutritionally diverse foods were suffering from wasting than 18% of children whose mothers did not express positive attitudes about feeding children nutritionally diverse foods.

Table 24

Malnutrition and Mothers' Attitudes About Using Nutritionally Diverse Food

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			4.61	0.032	0.12
Yes	45.8%	58.3%			
No	54.2%	41.7%			
Total	100%	100%			
Wasted			2.46	0.117	0.09
Yes	11.7%	18.1%			
No	88.3%	81.9%			
Total	100%	100%			
Underweight			9.50	0.002	0.18
Yes	22.3%	38.6%			
Not	77.7%	61.4%			
Total	100%	100%			

The results of this research study showed that there was a statistically significant association between mothers' attitudes about meal frequency and stunting, $\chi 2$ (1, N = 306) = 8.06, p = .005. The results indicated that significantly more children (58 %) whose mothers did not express positive attitudes about meal frequencies were stunted than (42%) of children whose mothers expressed positive attitudes about meal frequencies. The results of this research study also revealed that there was a statistically significant association between mothers' attitudes about meal frequency and underweight, $\chi 2$ (1, N = 306) = 7.92, p = 0.005. The results showed that 36% of children whose mothers did not express positive attitudes about meal frequency than 21% of children whose mothers expressed positive attitudes about meal frequency were underweight. However, there was no statistically significant association between mothers' attitudes about meal frequency and wasting, $\chi 2$ (1, N = 306) = 1.58, p = .208. The results of this study revealed that 12% of children whose mothers expressed positive attitudes about meal frequency than 17% of children whose mothers did not express positive attitudes about meal frequency were suffering from wasting.

Table 25

Malnutrition and Mothers' Attitudes About Meal Frequency

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			8.06	0.005	0.16
Yes	42.0%	58.3%			
No	58.0%	41.7%			
Total	100%	100%			
Wasted			1.58	0.208	0.07
Yes	11.6%	16.7%			
No	88.4%	83.3%			
Total	100%	100%			
Underweight			7.92	0.005	0.16
Yes	21.0%	35.7%			
Not	79.0%	64.3%			
Total	100%	100%			

The results of this research study revealed that there was a statistically significant association between mothers' attitudes about safe preparation of complementary foods and stunting, $\chi 2$ (1, N = 306) = 8.77, p = .003. Significantly more mothers who did not express positive attitudes about safe preparation of complementary foods (67%) had children who were stunted than mothers who expressed positive attitudes about safe preparation of complementary foods (46%). The Cramer's V= 0.17 which indicated that mothers' positive attitudes about safe preparation of complementary foods had small effect size on stunting in children. There was also a statistically significant association between mothers' attitudes about safe preparation of complementary foods and underweight, $\chi 2$ (1, N = 306) = 8.94, p = 0.003. The results indicated that 44% of children whose mothers did not express positive attitudes about safe preparation of complementary foods than 23% of children whose mothers expressed positive attitudes about safe preparation of complementary foods were underweight. On the contrary, there was no statistically significant association between mothers' expressing positive attitudes about safe preparation of complementary foods and wasting, $\chi 2$ (1, N = 306) = 1.44, p = .230.

Table 26

Malnutrition and Mothers' Attitudes About Safe Preparation of Complementary Foods

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			8.77	0.003	0.17
Yes	46.4%	66.7%			
No	53.6%	33.3%			

Total	100%	100%			
Wasted			1.44	0.230	0.07
Yes	13.1%	18.8%			
No	86.9%	81.2%			
Total	100%	100%			
Underweight			8.94	0.003	0.17
Yes	24.9%	43.5%			
Not	75.1%	56.5%			
Total	100%	100%			

As illustrated in table 20, there was no statistically significant association between mothers' attitudes about the use of vitamin and mineral supplements and stunting, $\chi 2$ (1, N = 306) = 2.66, p = .103. The results of this research study revealed that mothers who did not express positive attitudes about the use of vitamin and mineral supplements (54%) had children who were stunted than mothers who expressed positive attitudes about the use of vitamin and mineral supplements (43%). There was also no statistically significant association between mothers' expressing positive attitudes about the use of vitamin and mineral supplements and wasting, $\chi 2$ (1, N = 306) = 0.02, p = .896. The results of this study indicated that 15% of children whose mothers expressed positive attitudes about vitamins and minerals as compared to 14% of children whose mothers did not express positive attitudes about the use of vitamins and minerals were experiencing wasting. However, the study results showed that there was a statistically significant association between mothers' expressing positive attitudes about the use of vitamin and mineral supplements and underweight, $\chi 2$ (1, N = 306) = 10.9, p = .001. Specifically, 15% of children whose mothers expressed positive attitudes about consuming vitamins and mineral supplements by their children as compared to 34% of children whose mothers did not have express positive attitudes about consuming vitamins and minerals by their children were underweight.

Table 27

Malnutrition and Mothers' Attitudes About the Use of Vitamin and Mineral Supplements

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			2.66	0.103	0.09
Yes	43.2%	53.8%			
No	56.8%	42.6%			
Total	100%	100%			
Wasted			0.02	0.896	0.01
Yes	14.8%	14.2%			
No	85.2%	85.8%			
Total	100%	100%			
Underweight			10.9	0.001	0.19
Yes	14.8%	34.2%			
Not	85.2%	65.8%			
Total	100%	100%			

The results of this research study showed that there was no statistically significant association between mothers' attitudes about feeding patterns during and after illnesses and stunting, $\chi 2$ (1, N = 306) = 0.50, p = .478. The results indicated that 55% of children whose mothers did not express positive attitudes about feeding patterns during and after illnesses as compared to 50% of children whose mothers expressed positive attitudes about feeding patterns during and after illnesses were stunted. There was also no statistically significant association between mothers' attitudes about feeding patterns during and after illnesses and wasting, $\chi 2$ (1, $N = 306$) = 0.08, $p = .784$. The results of this study indicated that 14% of children whose mothers expressed positive attitudes about feeding patterns during and after illnesses as compared to 15% of children whose mothers did express positive attitudes about feeding patterns during and after illnesses were wasting. Moreover, the study concluded that there was no statistically significant association between mothers' expressing positive attitudes about feeding patterns during and after illnesses and underweight, $\chi 2$ (1, $N = 306$) = 0.08, $p = .780$. The results of this study indicated that 29% of children whose mothers expressed positive attitudes about feeding patterns during and after illnesses as compared to 28% of children whose mothers did not express positive attitudes about feeding patterns during and after illnesses were underweight.

Table 28

Malnutrition and Mothers' Attitudes About Feeding Patterns During and After Illnesses

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			0.50	0.478	0.04
Yes	50.0%	55.2%			
No	50.0%	44.8%			
Total	100%	100%			
Wasted			0.08	0.784	0.02
Yes	14.1%	15.5%			

No	85.9%	84.5%			
Total	100%	100%			
Underweight			0.08	0.780	0.02
Yes	29.4%	27.6%			
Not	70.6%	72.4%			
Total	100%	100%			

There was no statistically significant association between mothers' attitudes about responsive feeding and stunting, $\chi 2$ (1, N = 306) = 3.74, p = .053. The results indicated that 55% of children whose mothers did not express positive attitudes about responsive feeding as compared to 43% of children whose mothers expressed positive attitudes about responsive feeding were stunted. The study results also indicated that there was no statistically significant association between mothers' expressing positive attitudes about responsive feeding and underweight, $\chi 2$ (1, N = 306) = 1.85, p = .174. I found that 16% of children whose mothers did not express positive attitudes about responsive feeding as compared to 11% of children whose mothers expressed positive attitudes about responsive feeding were wasted. Whereas, there was a statistically significant association between mothers' expressing positive attitudes and underweight, $\chi 2$ (1, N = 306) = 6.04, p = .014. I found that 34% of children whose mothers did not express positive attitudes about responsive feeding as compared to 22% of children whose mothers expressed positive attitudes about complementary feeding were underweight.

Table 29

Malnutrition and Mothers' Attitudes About Responsive Feeding

	Express positive attitudes	Do not express positive attitudes	Chi Square value	P value	Cramer's V
Stunted			3.74	0.053	0.05
Yes	43.3%	55.0%			
No	56.7%	45.5%			
Total	100%	100%			
Wasted			1.85	0.174	0.08
Yes	10.6%	16.3%			
No	89.4%	83.7%			
Total	100%	100%			
Underweight			6.04	0.014	0.14
Yes	20.2%	33.7%			
Not	79.8%	66.3%			
Total	100%	100%			

Mothers' Practices of Complementary Feeding and Malnutrition

The chi-square test indicated that there was a statistically significant association between mothers' practices about introducing complementary foods in compliance with WHO' guideline and stunting, $\chi 2$ (1, $N = 306$) = 14.1, $p = .001$. As illustrated in table 23, stunting was significantly higher among children whose mothers did not introduce complementary foods to children at the age of 6 months as compared to children whose mothers introduced complementary foods to children at the age of 6 months.

Specifically, 61% of children whose mothers did not introduce complementary foods as compared to 39% of children whose mothers introduced complementary foods were stunted. The Cramer's V= 0.22 which indicated that mothers practicing the introduction of complementary foods in compliance with the WHO's guideline had a medium effect size on stunting. I also found that there was a statistically significant association between mothers practicing the introduction of complementary foods and underweight, $\chi 2$ (1, N = 306) = 11, p = .001. I found that 38% of children whose mothers did not practice the introduction of complementary foods in compliance with WHO's guideline than 19% of children whose mothers practiced the introduction of complementary foods in compliance with the WHO's guideline were underweight. However, there was no statistically significant association between mothers' practicing the introduction of complementary foods and wasting, $\chi 2$ (1, N = 306) = 0.04, p = .849. I found that 14% of children whose mothers did not practice the introduction of complementary foods in compliance with the WHO's guideline than 15% of children whose mothers practiced the introduction of complementary foods in compliance with the WHO's guideline were acutely malnourished (wasted) in Afghanistan.

Table 30

Malnutrition and Mothers' Practices of the Right Age to Introduce Complementary Foods

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			14.1	0.001	0.22
Yes	39.4%	61.0%			
No	60.6%	39.0%			

Total	100%	100%			
Wasted			0.04	0.849	0.01
Yes	14.8%	14.0%			
No	85.2%	86.0%			
Total	100%	100%			
Underweight			13.0	0.001	0.21
Yes	19.0%	37.8%			
Not	81.0%	62.2%			
Total	100%	100%			

The chi-square test indicates that there was a statistically significant association between mothers' practicing nutritionally diversified complementary foods and stunting, $\chi 2$ (1, N = 306) = 7.87, p = .005. As illustrated in table 24, malnutrition was significantly higher among children whose mothers did not feed them nutritionally diversified foods in compliance with the WHO's guideline than children whose mothers fed them nutritionally diversified foods in compliance with the WHO's guideline. Specifically, 54% of children whose mothers did not feed them nutritionally diversified foods as compared to 27% of children whose mothers fed them nutritionally diverse foods were stunted. There was also a statistically significant association between mothers' practicing nutritionally diverse foods and underweight, $\chi 2$ (1, N = 306) = 8.11, p = .004. I found that 32% of children whose mothers did not feed them nutritionally diverse foods in compliance with the WHO's guideline than 7% of children whose mothers fed them nutritionally diverse foods in compliance with the WHO's guideline were underweight. Whereas, there was no statistically significant association between mothers' practicing nutritionally diverse foods and wasting, $\chi 2$ (1, N = 306) =

0.52, *p* = .472. I found that 15% of children whose mothers did not feed them nutritionally diverse foods in compliance with the WHO's guideline than 10% of children whose mothers fed them nutritionally diverse foods in compliance with the WHO's guideline were wasted in Afghanistan.

Table 31

Malnutrition and Mothers' Practices of Nutritionally Diverse Foods

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			7.87	0.005	0.16
Yes	26.7%	53.6%			
No	73.3%	46.4%			
Total	100%	100%			
Wasted			0.52	0.472	0.04
Yes	10.0%	14.9%			
No	90.0%	85.1%			
Total	100%	100%			
Underweight			8.11	0.004	0.16
Yes	6.7%	31.5%			
Not	93.3%	68.5%			
Total	100%	100%			

The study results showed that there was a statistically significant association between mothers' practicing meal frequency and stunting, $\chi 2$ (1, *N* = 306) = 16.2, p = .001. As illustrated in 24, malnutrition was significantly higher among children whose mothers did not practice meal frequency than children whose mothers practiced meal frequency in compliance with the WHO's guideline. Specifically, 58% of children whose mothers did not practice meal frequency in compliance with the WHO's guideline than 33% of children whose mothers practiced meal frequency in compliance with the WHO's guideline. There was also a statistically significant association between mothers' practicing meal frequency and underweight, $\chi2$ (1, N = 306) = 11.3, p = .001. I found that 35% of children whose mothers did not practice meal frequency in compliance with the WHO's guideline than 15% of children whose mothers practiced meal frequency in compliance the WHO's guideline was underweight. Whereas there was no statistically significant association between mothers' practicing meal frequency and wasting, $\chi2$ (1, N = 306) = .053, p = .818. I found that 14% of children whose mothers did not practice meal frequency in compliance with the WHO's guideline than 10% of children whose mothers practiced meal frequency in compliance with the WHO's guideline suffered from wasting in Afghanistan.

Table 32

Malnutrition and Mothers' Practices of Meal Frequency

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			16.2	0.001	0.23
Yes	32.6%	58.2%			
No	67.4%	41.8%			
Total	100%	100%			
Wasted			0.053	0.818	0.01
Yes	15.1%	14.1%			
No	94.9%	85.9%			
Total	100%	100%			
Underweight			11.3	0.001	0.19
Yes	15.1%	34.5%			

Not	84.9%	65.5%
Total	100%	100%

The results of this research study indicated that there was no statistically significant association between mothers' practicing safe preparation of complementary foods and stunting, $\chi2$ (1, N = 306) = 0.387, p = .534, wasting $\chi2$ (1, N = 306) = 0.63, p = .427, and underweight, $\chi2$ (1, N = 306) = 0.05, p = .815. Stunting was not statistically significantly higher among children whose mothers did not practice safe preparation of complementary foods (52%) than children whose mothers practiced safe preparation of complementary foods (47%) in Afghanistan. Wasting was also not statistically significantly higher among children whose mothers did not practice safe preparation of complementary foods (15%) than children whose mothers practiced safe preparation of complementary foods (11%) in Afghanistan. Finally, underweight was not statistically significantly higher among children whose mothers did not practice safe preparation of complementary foods (29%) than children whose mothers practiced safe preparation of complementary foods (28%) in Afghanistan. Therefore, I failed to reject the null hypothesis.

Table 33

Malnutrition and Mothers' Practices of Safe Preparation of Complementary Foods

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			0.39	0.534	0.04
Yes	46.8%	51.7%			
No	53.2%	48.3%			

Total	100%	100%			
Wasted			0.63	0.427	0.04
Yes	10.6%	15.1%			
No	89.4%	84.9%			
Total	100%	100%			
Underweight			0.05	0.815	0.01
Yes	27.7%	29.3%			
Not	72.3%	70.7%			
Total	100%	100%			

The results of chi-square test indicated that there was no statistically significant association between mothers' practicing the consumption of vitamin and mineral by children and stunting, $\chi 2$ (1, N = 306) = 2.61, p = .105, and wasting, χ2 (1, N = 306) = 0.15, p = .702. As illustrated in table 26, stunting was not statistically significantly higher among children who consumed vitamin and mineral supplements (47%) as compared to children who did not consume vitamin and mineral supplements (61%). I also found that wasting was not statistically significantly higher among children who did not consume vitamin and mineral supplements (86%) than children who consumed vitamin and mineral supplements (84%) in Afghanistan. Whereas, there was a statistically significant association between mothers' practicing the consumption of vitamin and mineral supplements by children and underweight, χ2 (1, N = 306) = 7.39, p =.007. I found that underweight was higher among children who did not consume vitamin and mineral supplements (32%) than children who consumed vitamin and mineral supplements (12%) in Afghanistan.

Table 34

Malnutrition and Mothers' Practicing the Consumption of Vitamins and Minerals by Children

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			2.61	0.105	0.01
Yes	39.5%	52.9%			
No	60.5%	47.1%			
Total	100%	100%			
Wasted			0.15	0.702	0.02
Yes	16.3%	14.1%			
No	83.7%	85.9%			
Total	100%	100%			
Underweight			7.39	0.007	0.15
Yes	11.6%	31.9%			
Not	88.4%	68.1%			
Total	100%	100%			

I found that there was no statistically significant association between mothers' practicing feeding patterns during and after illnesses and stunting, $\chi 2$ (1, N = 306) = 0.387, p = .534, wasting, $\chi 2$ (1, N = 306) = 3.60.1, p = .058, wasting, $\chi 2$ (1, N = 306) = 0.01, p = .936, and underweight, $\chi 2$ (1, N = 306) = 0.60, p = .432. Stunting was not statistically significantly higher among children whose mothers did not practice feeding patterns during and after illnesses (60%) than children whose mothers practiced feeding patterns during and after illnesses (48 %) in Afghanistan. Wasting was also not statistically significantly higher among children whose mothers did not practice feeding patterns during and after illnesses (14%) than children whose mothers practiced feeding patterns during and after illnesses (15%). Finally, underweight was not statistically significantly higher among children whose mothers did not practice feeding patterns during and after illnesses (26%) whose mothers practiced feeding patterns during and after illnesses (30%) in Afghanistan. Therefore, I failed to reject the null hypothesis.

Table 35

Malnutrition and Mothers' Practices of Feeding Patterns During and After Illnesses

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			3.60	0.058	0.05
Yes	47.8%	60.3%			
No	52.2%	39.7%			
Total	100%	100%			
Wasted			0.01	0.936	0.01
Yes	14.5%	14.1%			
No	85.5%	85.9%			
Total	100%	100%			
Underweight			0.60	0.432	0.04
Yes	30.3%	25.6%			
Not	69.7%	74.4%			
Total	100%	100%			

The results of this research study showed that there were statistically significant association between mothers' practices of responsive feeding and stunting, $\chi2$ (1, N = 306) = 20.1, p = .001 and underweight $\chi2$ (1, N = 306) = 7.61, p =.006. As illustrated in table 29, stunting was statistically significantly higher among children whose mothers did not practice responsive feeding than children whose mothers practiced responsive feeding. Specifically, only 15% of children whose mothers practiced responsive feeding were stunted, while this figure was 56% among children whose mothers did not practice responsive feeding. Moreover, underweight was statistically significantly higher among children whose mothers did not practice responsive feeding (32%) than children whose mothers practiced responsive feeding (9%). Whereas, there was no statistically significant association between mothers, practicing responsive feeding and wasting, $\chi2$ (1, *N* = 306) = 0.21, *p* = .465. The results showed that 15% of children whose mothers did not practice responsive feeding than 12% of children whose mothers practiced responsive feeding suffered from wasting.

Table 36

Malnutrition and Mothers' Practices of Responsive Feeding

	Practice	Do not practice	Chi Square value	P value	Cramer's V
Stunted			20.1	0.001	0.26
Yes	14.7%	55.5%			
No	85.3%	44.5%			
Total	100%	100%			
Wasted			0.21	0.465	0.03
Yes	11.8%	14.7%			
No	88.2%	85.3%			
Total	100%	100%			
Underweight			7.61	0.006	0.16
Yes	8.8%	31.6%			
Not	91.2%	68.4%			
Total	100%	100%			

Binomial and Multiple Logistic Regression Analyses

Logistic regression modelings are classified as binary and multinomial (Field, 2013). In this research study, I applied binary and multiple logistic regression modelings to assess how well a single or set of independent (predictor) variables predict categorical (response) variables (Field, 2013). The predictor variables were defined as mothers' knowledge, attitudes, and practices about complementary infant feeding. Based on the WHO's guideline for complementary feeding of the breastfed child, the principles of complementary infant feeding were defined as (1) introducing complementary foods at the right time to children, (2) meal frequency,(3) food diversity, (4) safe preparation of complementary foods, (5) use of vitamins and minerals, (6) feeding patterns during and after illnesses, and (7) responsive feeding (WHO, 2001). Each of these principles turned out to be a predictor variable in this research study, therefore, the independent (predictor) variables were defined as mothers' knowledge, attitudes, and practices about complementary infant feeding in compliance with the WHO's guideline. The predictor variables were dichotomous, scored as 0 for no (mothers did not have knowledge about complementary infant feeding, mothers did not express positive attitudes about practicing complementary infant feeding or mothers did not practice complementary infant feeding) and 1for yes (mothers had knowledge about complementary infant feeding, mothers expressed positive attitudes about practicing complementary infant feeding, and mothers practiced complementary infant feeding) in compliance with the WHO guideline.

The dependent (outcome) variable was defined as malnutrition. According to the WHO and UNICEF, malnutrition is classified as chronic malnutrition (stunting), acute malnutrition (wasting), and underweight (WHO & UNICEF, 2009). The outcome variable was also a dichotomous variable scored as 0 for no (the child is not stunted, not wasted or not underweight) and 1 for yes (the child is stunted, wasted or underweight).

To address all three research questions and their related hypotheses, at first, I have run a binary regression to assess if each predictor variable was a statistically significant predictor of a single outcome variable in the study. In the next step, the research has run multiple logistic regression modelings to assess if the full model containing all predictor variables was statistically significant predictors of the outcome variables. I presented the results of binary and multiple logistic regressions under the following domains: (1) the association between mothers' knowledge about complementary infant feeding and malnutrition in children, (2) the association between mothers' attitudes about complementary infant feeding and malnutrition, and (3) the association between mothers' mothers' practices of complementary infant feeding and malnutrition in children. It is worth mentioning that I applied the WHO and UNICEF's classification of malnutrition to assess the association of mother's knowledge, attitudes, and practices about complementary infant feeding and malnutrition in this research study (WHO & UNICEF, 2009).

The Underlying Assumptions of the Logistic Regression Statistical Tests

The assumptions of the logistic regression are linearity, and multicollinearity (Field, 2013). Moreover, the assumptions of logistic regression emphasize on lack of outliers and the dichotomous nature of dependent (outcome) variables in the model (Statistics Solutions, 2016).

To test for linearity, a scatter plots were produced for the standardized residuals and the standardized predicted values. If the scatterplot patterns were not curvilinear, then the assumption of linearity has not been violated (Field, 2013). Based on the results of the scatter plots, the assumption of linearity has not been violated. The variable inflation factor (VIF) values were examined to assess no perfect multicollinearity. According to Field (2013), if the VIF values for any independent variable are 10 or above, then the assumption of no perfect multicollinearity has been violated. The results indicated that there was no violation in no perfect multicollinearity for mothers' knowledge about the right age to start complementary foods (VIF= 1.355), mothers' knowledge about nutritionally diverse foods (VIF= 1.455), mothers' knowledge about meal frequency (VIF= 1.769), mothers' knowledge about safe preparation of foods (VIF= 1.344), mothers' knowledge about vitamin and mineral supplements (VIF=2.455), mothers' knowledge about feeding patterns during and after illnesses (VIF= 3.498), and mothers' knowledge about responsive feeding (VIF= 1.771). The results also indicated that there was no violation in no perfect multicollinearity for mothers' attitudes about the right age to start complementary foods (VIF=1.232), mothers' attitudes about nutritionally diverse foods (VIF=1.480), mothers' attitudes about meal frequency (VIF= 1.483), mothers' attitudes about safe preparation of foods (VIF=1.407), mothers' attitudes about vitamin and mineral supplements (VIF= 3.775), mothers' attitudes about feeding patterns during and after illnesses (VIF= 3.019), and mothers' attitudes about responsive feeding (VIF= 1.316). Moreover, the results indicated that there was no violation in no perfect multicollinearity for mothers' practices of the right age to start complementary foods

(VIF= 1.421), mothers' practices of nutritionally diverse foods VIF= 1.488), mothers' practices of meal frequency (VIF= 1.482), mothers' practices about safe preparation of foods (VIF= 1.357), mothers' practices of vitamin and mineral supplements (VIF=2.394), mothers' practices of feeding patterns during and after illnesses (VIF= 3.392), and mothers' practices of responsive feeding (VIF= 1.806). The results indicated that there was no violation in the assumption of no perfect multicollinearity for any of the independent variables, as the VIF values for maternal KAP ranged from 1.242 to 3.498. To test for the assumptions of lack of missing values and dichotomous nature of outcome variable, a frequency analyses were run. The results of analyses showed that there were no missing values in the model. The outcome variable was also dichotomous in nature in the regression model (Field, 2013).

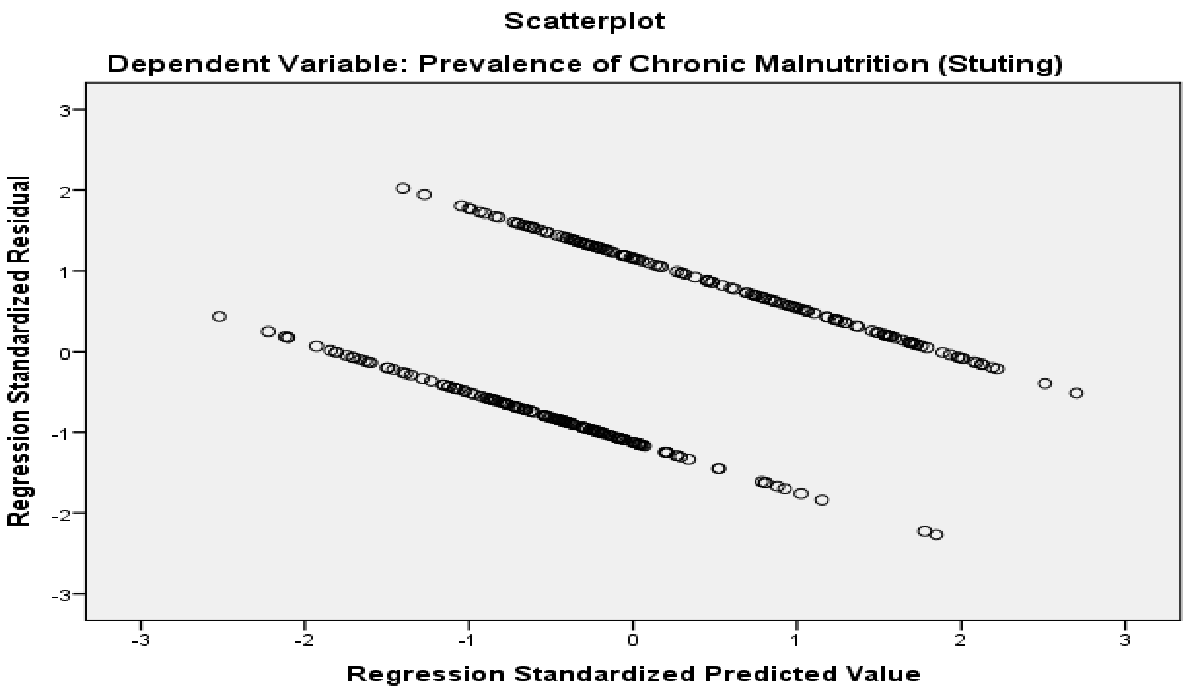

Figure 4. Scatterplot of the Standardized Predicted Values and Standardized Residuals.

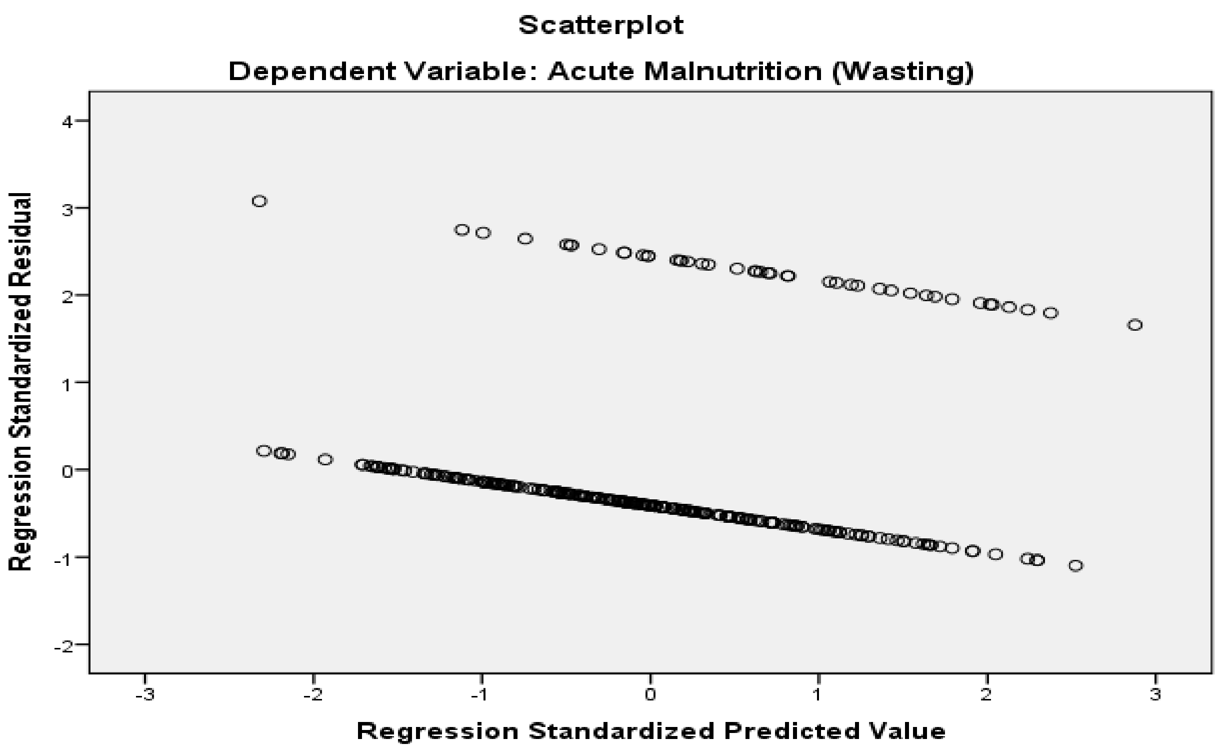

Figure 5. Scatterplot of the Standardized Predicted Values and Standardized Residuals.

The results of regression models indicated that there was no violation in the assumptions of linearity, no perfect multicollinearity, missing values, and dichotomous nature of the outcome variables. Therefore, the results of the logistic regression can be projectable beyond the study sample to the population in Afghanistan (Field, 2012).

Mothers' Knowledge About Complementary Feeding and Stunting

The results of the logistic regression model indicated that the model containing all predictor variables were statistically significant, χ^2 (3, N = 306) = 14.54, $p < .003$, indicating that the model was able to distinguish between children who were chronically malnourished (stunted) and were not chronically malnourished (not stunted) in a new relationship. The model as a whole explained between 4.6 (Cox & Snell R square) to 6.2 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months in Afghanistan, and correctly classified 58% of the cases. Only 1 predictor variable made a statistically significant contribution to the model. Mothers' knowledge about introducing complementary foods at the right time to children aged between 6 to 24 months was statistically significant predictor of malnutrition in children, where mothers who did not have knowledge about introducing complementary foods at the right time to children were 1.3 times more likely to have stunted children than mothers who had knowledge about introducing complementary foods at right time to children. Based on the results of the logistic regression model, the research rejected the null hypotheses Please see the description of the model in Table 37 below.

Table 37

Variables in the Equation: Stunting and Mothers' Knowledge About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on introducing CF	.693	.236	8.640	1	.003	2.001	1.260	3.177
Mothers' literacy	.103	.341	.091	1	.762	1.109	.569	2.161
Family's income	-.002	.001	3.942	1	.047	.987	.996	1.000
Constant	-.013	.400	.001	1	.974	.987		

The results of the logistic regression model indicated that the model containing all predictor variables were statistically significant, χ^2 (3, N = 306) = 17.03, $p < .001$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 5.4 (Cox & Snell R square) to 7.2 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 62% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' knowledge about food diversity was a statistically significant predictor of malnutrition in children, where mothers who did not have knowledge about food diversity were 2.8 times more likely to have stunted children than mothers who had knowledge about food diversity in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1 USD) increase in family income was associated with a child being .99 times less likely to be stunted. Thus, I rejected the null hypotheses given mothers' knowledge about food diversity and family income were statistically significant predictors of stunting in the model. Please see the description of the model in Table 38 below.

Table 38

Variables in the Equation: Stunting and Mothers' Knowledge About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on diverse foods	1.032	.318	10.549	1	.001	2.805	1.505	5.228
Mothers' literacy	-.054	.351	.024	1	.878	.947	.477	1.883
Family's income	-.002	.001	4.220	1	.040	.998	.996	1.000
Constant	-.387	.445	.755	1	.385	.679		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 20.51, p < .001, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 6.5 (Cox

& Snell R square) to 8.6 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 63% of the cases. Mothers' knowledge about meal frequency as the only predictor variables made a statistically significant contribution to the model. Mothers' knowledge about meal frequency was a statistically significant predictor of malnutrition in children, where mothers who did not have knowledge about meal frequency were 2.6 times more likely to have stunted children than mothers who had knowledge about meal frequency in compliance with the WHO's guideline. Based on the results of the logistic regression model,I rejected the null hypotheses. Please see the description of the model in Table 39 below.

Table 39

Variables in the Equation: Stunting and Mothers' Knowledge About Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on meal frequency	.937	.248	14.316	1	.001	2.553	1.571	4.148
Mothers' literacy	.020	.346	.003	1	.954	1.020	.518	2.008
Family's income	-.002	.001	3.545	1	.060	.998	.996	1.000
Constant	-.227	.416	.298	1	.585	.797		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 12.8, p < .01, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 4.1 (Cox & Snell R square) to 5.5 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 59% of the cases. Mothers' knowledge about safe preparation of complementary foods as the only predictor variables made a statistically significant contribution to the model. Mothers' knowledge about safe preparation of complementary foods was a statistically significant predictor of malnutrition in children, where mothers who did not have knowledge about safe preparation of complementary foods were 1.9 times more likely to have stunted children than mothers who had knowledge about safe preparation of complementary foods in compliance with the WHO's guiding principles of the breastfed child (WHO, 2001). Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 40 below.

Table 40

Variables in the Equation: Stunting and Mothers' Knowledge About Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on safe preperation of CFs	.622	.226	6.922	1	.009	1.862	1.172	2.958
Mothers' literacy	.032	.341	.009	1	.926	1.032	.529	2.013

Familys' income	-.002	.001	4.031	1	.045	.998	.996	1.000
Constant	.064	.394	.026	1	.872	1.066		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 12.8, p > .05, indicating that the model was not able to distinguish between children who were stunted and were not stunted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about vitamins and mineral supplements and stunting. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 41 below.

Table 41

Variables in the Equation: Stunting and Mothers' Knowledge About Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on vits and minerals	.055	.361	.023	1	.878	1.057	.521	2.144
Mothers' literacy	.126	.375	.113	1	.737	1.134	.544	2.363
Familys' income	-.002	.001	4.624	1	.032	.998	.996	1.000
Constant	.266	.414	411	1	.521	1.304		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 9.43, $p < .05$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 3.0 (Cox & Snell R square) to 4.0 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 55% of the cases. The family income predicator variable made a statistically significant contribution to the model. Family income was a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Thus, I rejected the null hypotheses given family income was statistically significant predictors of malnutrition (stunting) in the model. Please see the description of the model in Table 42 below.

Table 42

Variables in the Equation: Stunting and Mothers' Knowledge About Feeding Patterns During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on feeding during and after illness	.542	.287	3.577	1	.059	1.720	.980	3.017

Mothers' literacy	.111	.337	.108	1	.742	1.117	.577	2.164
Familys' income	-.002	.001	4.871	1	.027	.998	.995	1.000
Constant	.217	.385	.319	1	.572	1.243		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 17.48, $p < .01$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 5.6 (Cox & Snell R square) to 7.4 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 61% of the cases. Mothers' knowledge of responsive feeding variable made a statistically significant contribution to the model. Mothers' knowledge of responsive feeding was a statistically significant predictor of stunting in children, where mothers who did not have knowledge of responsive feeding were 3.7 times more likely to have stunted children than mothers who had knowledge of responsive feeding in compliance with the WHO's guideline. Thus, I rejected the null hypotheses. Please see the description of the model in Table 43 below.

Table 43

Variables in the Equation: Stunting and Mothers' Knowledge About Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers'	1.299	.403	10.360	1	.001	3.664	1.662	8.080

knowledge on responsive feeding								
Mothers' literacy	-.179	.363	.244	1	.622	.836	.410	1.703
Familys' income	-.002	.001	3.384	1	.066	.998	.996	1.000
Constant	-.616	.490	1.584	1	.208	.540		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 45.33, $p <$ .001, indicating that the model could distinguish between children who were chronically malnourished (stunted) and were not chronically malnourished (stunted) in a new relationship. The model as a whole explained between 13.8 (Cox & Snell R square) to 18.4 (Nagelkerke R squared) of the variance in chronic malnutrition (stunting) in children aged between 6 to 24 months in Afghanistan, and correctly classified 70% of the cases. Based on the results of Table 30, three predictor variables made a significant contribution to the model. The strongest predictor was mothers' knowledge about food diversity in compliance with the WHO's guideline, where mothers who did not have knowledge food diversity were 2.3 times more likely to have stunted children than mothers who had knowledge about food diversity in compliance with the WHO's guideline. Mothers' knowledge about meal frequency was also a significant predictor where mothers who did not have knowledge about meal frequency were 2.22 times more likely to have stunted children as compared to mothers who had knowledge about meal frequency. Finally, mothers' knowledge about introducing complementary foods at the right time was also a significant predictor of malnutrition in children where mothers who did not have knowledge about introducing complementary foods at the right time were 1.7 times more likely to have stunted children than mothers who had knowledge about introducing complementary foods at the right time. Based on the results of the logistic regression model, the null hypotheses were rejected given three predictor variables mentioned above were statistically significant predictors of malnutrition (stunting) in the model. Please see the description of the model in Table 44 below.

Table 44

Variables in the Equation: Stunting and Mothers' Knowledge About Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on introducing CF	.535	.250	4.587	1	.032	1.707	1.046	1.785
Mothers' knowledge on diverse foods	.836	.344	5.897	`1	0.015	2.306	1.175	4.526
Mothers' knowledge on meal frequency	.798	.263	9.198	1	0.002	2.220	1.326	3.717

Mothers' knowledge on safe prep of foods	.333	.255	1.698	1	.193	1.395	.846	2.300
Mothers' knowledge on vit and minerals	-270	.393	.471	1	.493	.764	.354	1.649
Mothers' knowledge on feeding during and after illnesses	.521	.309	2.848	1	.091	1.684	.919	3.085
Mothers' knowledge on responsive feeding	.683	.438	2.437	1	.119	1.981	.840	4.672
Mothers' literacy	-.306	.416	.541	1	.462	.736	.325	1.665
Family's income	-.002	.001	2.786	1	.095	.998	.996	1.000
Constant	-1.470	.568	6.686	1	.010	.230		

Mothers' Knowledge About Complementary Infant Feeding and Wasting

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.37, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about introducing complementary foods to children at the right time wasting in children aged between 6 months to 24 months in Afghanistan. Therefore, I failed to reject the null hypotheses. Please see the description of the model in Table 45 below.

Table 45

Variables in the Equation: Wasting and Mothers' Knowledge About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on introducing CF	.145	.329	.194	1	.659	1.156	.607	2.202
Mothers' literacy	.473	.561	.711	1	.399	1.606	.534	4.824
Family's income	-.002	.002	1.467	1	.226	.998	.994	1.001
Constant	-1.941	.645	9.067	1	.003	.144		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.84, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about food diversity in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 46 below.

Table 46

Variables in the Equation: Wasting and Mothers' Knowledge About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on diverse foods	.372	.473	.618	1	.432	1.450	.574	3.663
Mothers' literacy	.416	.567	.538	1	.463	1.515	.499	4.601
Family's income	-.002	.002	1.478	1	.224	.998	.994	1.001
Constant	-2.130	.712	8.962	1	.003	.119		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 4.01, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about meal frequency in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 47 below.

Table 47

Variables in the Equation: Wasting and Mothers' Knowledge About Meal Frequency

	B	*S.E.*	Wald	*df*	*P*	Exp(B)	95% CI for EXP(B) Lower	Upper
Mothers' knowledge on meal frequency	.323	.358	.812	1	.368	1.381	.684	2.789
Mothers' literacy	.436	.564	.596	1	.440	1.546	.512	4.672
Family's income	. -002	.002	1.356	1	.244	.998	.994	1.001
Constant	-2.065	.666	9.618	1	.002	.127		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 5.48, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about safe preparation of complementary foods in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 48 below.

Table 48

Variables in the Equation: Wasting and Mothers' Knowledge About Safe Preparation of Complementary Foods

	B	*S.E.*	Wald	*df*	*p*	Exp(B)	95% CI for EXP(B) Lower	Upper
Mothers' knowledge on safe preperation of CF	.510	.339	2.267	1	.132	1.666	.857	3.236
Mothers' literacy	.373	.569	.430	1	.512	1.452	.476	4.427
Family's Income	-.002	.002	1.271	1	.260	.998	.995	1.001
Constant	-2.084	.650	10.273	1	.001	.124		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 6.18, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about consuming vitamins and minerals by children in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 49 below.

Table 49

Variables in the Equation: Wasting Mothers' Knowledge About Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on vits and minerals	-.841	.468	3.222	1	.072	.431	.172	1.080
Mothers' literacy	.921	.625	2.171	1	.141	2.511	.738	8.542
Familys' income	-.002	.002	1.460	1	.227	.998	.994	1.001
Constant	-1.562	.645	5.856	1	.016	.210		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.18, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about feeding patterns during and after illnesses in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 50 below.

Table 50

Variables in the Equation: Wasting Mothers' Knowledge About Feeding Pattern During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on feeding pattern	.026	.393	.004	1	.948	1.026	.475	2.214
Mothers' literacy	.482	.562	.735	1	.391	1.619	.538	4.866
Familys' income	-.002	.001	1.547	1	.214	.998	.994	1.001
Constant	-1.877	.628	8.923	1	.003	.153		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 4.34, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about responsive feeding in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus,I failed to reject the null hypotheses. Please see the description of the model in Table 51 below.

Table 51

Variables in the Equation: Wasting and Mother's Knowledge About Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on responsive feeding	.650	.644	1.020	1	.313	1.915	.543	6.761
Mothers' literacy	.339	.575	.347	1	.556	1.403	.455	4.330
Familys' income	-.002	.002	1.296	1	.255	.998	.994	1.001
Constant	-2.357	.806	8.555	1	.003	.095		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 10.95, p > .05, indicating that the model was not able to distinguish between children who were acutely malnourished (wasted) and were not acutely malnourished (wasted) in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about complementary infant feeding and acute malnutrition (wasting) in children aged between 6 months to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 52 below.

Table 52

Variables in the Equation: Wasting and Mothers' Knowledge About Complementary Infant Feeding

	B	*S.E.*	Wald	*df*	*p*	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Mothers' knowledge on introducing CF	.064	.337	.036	1	.849	1.066	.551	2.062
Mothers' knowledge on diverse foods	.205	.500	.169	1	.681	1.228	.461	3.275
Mothers' knowledge on meal frequency	.317	.371	.731	1	.393	1.373	.664	2.841
Mothers' knowledge on safe prep of foods	.471	.353	1.781	1	.182	1.601	.802	3.195
Mothers' knowledge on vit and minerals	-1.023	.488	4.398	1	.036	.360	.138	.935
Mothers'	-.030	.405	.006	1	.941	.970	.438	2.147

knowledge on feeding during and after illnesses								
Mothers' knowledge on responsive feeding	.487	.687	.501	1	.479	1.627	.423	6.259
Mothers' literacy	.756	.648	1.362	1	.243	2.130	.598	7.584
Family's income	-.002	.002	.925	1	.336	.998	.995	1.002
Constant	-2.434	.873	7.778	1	.005	.088		

Mothers' Knowledge About Complementary Infant Feeding and Underweight

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 22.60, p < .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 7.1 (Cox & Snell R square) to 10.2 (Nagelkerke R squared) of the variance in underweight in children aged between 6 to 24 months in Afghanistan, and correctly classified 78% of the cases. I found that2 predictor variables made a statistically significant contribution to the model. Mothers' knowledge introducing complementary foods to children at the right time was a statistically significant predictor of malnutrition in children, where mothers who did not have knowledge about introducing complementary foods to children at the right time were 2.4 times more likely to have underweight children than mothers who had knowledge about introducing complementary foods to children at the right time. The WHO defines *the right time of introducing complementary foods* to children is 6 months of age (WHO, 2001). Moreover, mother's literacy level was a statistically significant predictor of underweight where mothers who were not literate were 3.4 times more likely to have underweight children than literate mothers. Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 53 below.

Table 53

Variables in the Equation: Underweight and Mothers' Knowledge About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on introducing CF	.881	.263	11.244	1	.001	2.413	1.442	4.038
Mothers' literacy	1.214	.504	5.808	1	.016	3.368	1.255	9.042
Family's income	-.001	.001	.885	1	.347	.999	.996	1.001
Constant	-2.230	.568	15.437	1	.001	.108		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 13.28, $p < .01$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 4.2 (Cox & Snell R square) to 6.1 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. One predictor variable made a statistically significant contribution to the model. Mothers' literacy was a statistically significant predictor, where mothers who were illiterate were 3.2 times more likely to have underweight children than mothers who were literate. Please see the description of the model in Table 54 below.

Table 54

Variables in the Equation: Underweight and Mothers' Knowledge About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on diverse foods	.533	.370	2.080	1	.149	1.704	.826	3.517
Mothers' literacy	1.150	.502	5.241	1	.022	3.159	1.180	8.457
Family's income	-.001	.001	1.238	1	.266	.999	.996	1.001
Constant	-2.137	.606	12.447	1	.001	.118		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 20.83, $p < .001$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 6.6 (Cox & Snell R square) to 9.4 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Two variables made a statistically significant contribution to the model. Mothers' knowledge about meal frequency was a statistically significant predictor of underweight in children, where mothers who did not have knowledge about meal frequency were 2.4 times more likely to have underweight children than mothers who had knowledge about meal frequency in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.2 times more likely to have underweight children than literate mothers. I rejected the null hypotheses given mothers' knowledge about meal frequency and mothers' education were statistically significant predictors of underweight in the model. Please see the description of the model in Table 55 below.

Table 55

Variables in the Equation: Underweight and Mothers' Knowledge About Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' knowledge on meal frequency	.884	.293	9.088	1	.003	2.420	1.362	4.298

Mothers' literacy	1.153	.505	5.215	1	.022	3.168	1.178	8.521
Family's income	. -001	.001	.741	1	.389	.999	.996	1.001
Constant	-2.342	.590	15.738	1	.001	.096		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 16.79, p < .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.3 (Cox & Snell R square) to 7.6 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Mothers' knowledge about safe preparation of complementary foods was the first predictor variables made a statistically significant contribution to the model. Mothers' knowledge about safe preparation of complementary foods was a statistically significant predictor of underweight, where mothers who did not have knowledge about safe preparation of complementary foods were 1.9 times more likely to have underweight children than mothers who had knowledge about safe preparation of complementary foods in compliance with the WHO's guiding principles of the breastfed child (WHO, 2001). Mothers' education was also a statistically significant variable where illiterate mothers were 3.1 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 56 below.

Table 56

Variables in the Equation: Underweight and Mothers' Knowledge About Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on safe preperation of CF	.624	.263	5.636	1	.018	1.866	1.115	3.122
Mothers' literacy	1.131	.504	5.045	1	.025	3.100	1.155	8.321
Family's Income	-.001	.001	.453	1	.342	.999	.996	1.001
Constant	-2.039	.562	13.155	1	.001	.130		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 11.69, $p < .01$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 3.8 (Cox & Snell R square) to 5.4 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71 % of the cases. Mothers' education was a statistically significant predictor variable where the illiterate mothers were 3 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 57 below.

Table 57

Variables in the Equation: Underweight and Mothers' Knowledge About Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on vits and minerals	.349	.448	.608	1	.435	1.418	.590	3.411
Mothers' literacy	1.091	.531	4.220	1	.040	2.977	1.051	8.430
Familys' income	-.002	.001	1.402	1	.236	.998	.996	1.001
Constant	-1.932	.587	10.813	1	.001	.145		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 11.07, $p < .05$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 3.6 (Cox & Snell R square) to 5.1 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Mothers' education was a statistically significant predictor, where illiterate mothers were 3.5 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 58 below.

Table 58

Variables in the Equation: Underweight and Mothers' Knowledge About Feeding Pattern During and After Illnesses

	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Mothers' knowledge on feeding patterns during and after illness	-.006	.308	.001	1	.984	.994	.544	1.816
Mothers' literacy	1.243	.499	6.203	1	.013	3.464	1.303	9.211
Familys' income	-.001	.001	1.345	1	.246	.998	.996	1.001
Constant	-1.764	.542	10.575	1	.001	.171		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 16.76, p < .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.3 (Cox & Snell R square) to 7.6 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71 % of the cases. Two variables made a statistically significant contribution to the model. Mothers' knowledge about responsive feeding was a statistically significant predictor of underweight in children, where mothers who did not have knowledge about responsive feeding were 3.3 times more likely to have underweight children than mothers who had knowledge about responsive feeding in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor where illiterate mothers were 2.8 times more likely to have underweight children than literate mothers. Thus, I rejected the null hypotheses. Please see the description of the model in Table 59 below.

Table 59

Variables in the Equation: Underweight and Mothers' Knowledge About Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on responsive feeding	1.183	.556	4.530	1	.033	3.264	1.098	9.703
Mothers' literacy	1.018	.509	4.005	1	.045	2.768	1.021	7.502
Familys' income	-.002	.002	1.296	1	.255	.998	.994	1.001
Constant	-2.357	.806	8.555	1	.003	.095		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 37.49, $p <$ .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 11.5 (Cox & Snell R square) to 16.5 (Nagelkerke R squared) of the variance in underweight in children aged between 6 to 24 months in Afghanistan, and correctly classified 74% of the cases. I found that 2 predictor variables made a significant contribution to the model. The strongest predictor was mothers' knowledge about introducing complementary foods in compliance with the WHO's guideline, where mothers who did not have knowledge of introducing complementary foods at the right time to children were 2.2 times more likely to have underweight children than mothers who had knowledge about introducing complementary foods at the right time to children. Mothers' knowledge about meal frequency was also a significant predictor where mothers who did not have knowledge about meal frequency were 2.2 times more likely to have underweight children than mothers who had knowledge about meal frequency. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 60 below.

Table 60

Variables in the Equation: Underweight and Mothers' Knowledge About Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' knowledge on introducing CF	.777	.270	8.258	1	.004	2.175	1.280	3.696

Mothers' knowledge on diverse foods	.214	.398	.288	1	.592	1.238	.567	2.703
Mothers' knowledge on meal frequency	.786	.305	6.658	1	.010	2.194	1.208	3.985
Mothers' knowledge on safe prep of foods	.484	.279	3.018	1	.082	1.623	.940	2.804
Mothers' knowledge on vit and minerals	.118	.470	.063	1	.802	1.125	.448	2.824
Mothers' knowledge on feeding during and after illness	-.182	.327	.310	1	.577	.834	.439	1.582
Mothers' knowledge on responsive feeding	.601	.591	1.033	1	.309	1.824	.572	5.812
Mothers' literacy	.927	.561	2.726	1	.099	2.526	.841	7.590
Family's income	-.001	.001	.367	1	.544	.999	.997	1.002
Constant	-3.570	.826	18.681	1	.000	.028		

Mothers' Attitudes About Complementary Infant Feeding and Stunting

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, *N* = 306) = 8.99, $p < .05$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 2.9 (Cox & Snell R square) to 3.9 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months and correctly classified 53% of the cases. The results indicated that the family income variable made a statistically significant contribution to the model. The family income variable was a statistically significant predictor of stunting in children where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Based on the results of the logistic regression model, I rejected the null. Please see the description of the model in Table 61 below.

Table 61

Variables in the Equation: Stunting and Mothers' Attitudes About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	.514	.289	3.156	1	.076	1.672	.948	2.947
Mothers' literacy	.113	.338	.111	1	.739	1.119	.577	2.171
Family's income	-.003	.001	5.529	1	.019	.997	.995	1.000

Constant	.263	.386	.465	1	.495	1.301

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 11.68, $p < .01$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 3.4 (Cox & Snell R square) to 5.0 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 57% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' positive attitudes about food diversity was a statistically significant predictor of malnutrition in children, where mothers who did not express positive attitudes about food diversity were 1.8 times more likely to have stunted children than mothers who expressed positive attitudes about food diversity in compliance with the WHO's guideline. Family income was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 62 below.

Table 62

Variables in the Equation: Mothers' Attitudes About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	S.E.	Wald	Df	P	Exp(B)	Lower	Upper
Mothers' attitudes	.583	.242	5.808	1	.016	1.792	1.115	2.880

on diverse foods								
Mothers' literacy	.045	.343	.017	1	.896	1.046	.534	2.047
Family's income	-.003	.001	6.056	1	.014	.997	.995	.999
Constant	.210	.388	.292	1	.589	1.234		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 13.54, $p < .01$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 4.3 (Cox & Snell R square) to 5.8 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 60% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' positive attitudes about meal frequency was a statistically significant predictor of malnutrition in children, where mothers who did not express positive attitudes about meal frequency were 1.9 times more likely to have stunted children than mothers who expressed positive attitudes about meal frequency. The level of family income was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore,I rejected the null hypotheses. Please see the description of the model in Table 63 below.

Table 63

Variables in the Equation: Mothers' Attitudes About Meal Frequency

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for

							EXP(B)	
							Lower	Upper
Mothers' attitudes on meal frequency	.654	.236	7.663	1	.006	1.922	1.210	3.054
Mothers' literacy	.055	.341	.026	1	.872	1.056	.541	2.061
Family's income	-.002	.001	4.750	1	.029	.998	.995	1.000
Constant	.021	.398	.003	1	.957	1.021		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 14.82, p < .01, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 4.7 (Cox & Snell R square) to 6.3 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 56% of the cases. Mothers' attitudes about safe preparation of complementary foods predictor variable made a statistically significant contribution to the model. Mothers' positive attitudes about safe preparation of complementary foods was a statistically significant predictor of malnutrition in children, where mothers who did not express positive attitudes about safe preparation of complementary foods were 2.4 times more likely to have stunted children than mothers who expressed positive attitudes about food diversity in compliance with the WHO's guideline. Family income was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted.

Thus, I rejected the null hypotheses. Please see the description of the model in Table 64 below.

Table 64

Variables in the Equation: Mothers' Attitudes About Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' attitudes on safe preperation of CF	.854	.291	8.621	1	.003	2.350	1.328	4.156
Mothers' literacy	.083	.339	.059	1	.808	1.086	.559	2.111
Family's income	-.002	.001	5.034	1	.025	.998	.995	1.000
Constant	.184	.387	.226	1	.635	1.202		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 8.03, $p < .05$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 2.6 (Cox & Snell R square) to 3.5 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 58% of the cases. One predictor variable made a statistically significant contribution to the model. The family income variable was a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Thus, I rejected the null hypotheses. Please see the description of the model in Table 65 below.

Table 65

Variables in the Equation: Stunting and Mothers' Attitudes About Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on vitamins and minerals	.421	.281	2.236	1	.135	1.523	.877	2.643
Mothers' literacy	-.039	.360	.012	1	.914	.962	.475	1.948
Familys' income	-.002	.001	4.912	1	.027	.998	.995	1.000
Constant	.157	.394	.158	1	.691	1.170		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 6.02, p > .05, indicating that the model was not able to distinguish between children who were stunted and were not stunted in a new relationship. Based on the results of logistic the regression model, I failed to reject the null hypotheses. Thus, the study results concluded that there was no statistically significant association between mothers' expressing positive attitudes about feeding patterns during and after illnesses and stunting. Please see the description of the model in Table 66 below.

Table 66

Variables in the Equation: Mothers' Attitudes About Feeding Pattern During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on feeding pattern	.145	.296	.239	1	.625	1.156	.647	2.065
Mothers' literacy	.145	.336	.187	1	.666	1.156	.599	2.232
Familys' income	-.002	.001	4.427	1	.035	.998	.996	1.000
Constant	.262	.387	.457	1	.499	1.299		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, $N = 306$) = 9.72, $p < .05$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 3.1 (Cox & Snell R square) to 4.2 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 60% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' attitudes about responsive feeding was a statistically significant predictor of malnutrition in children, where mothers who did not express positive attitudes about responsive feeding in compliance with the WHO's guideline were 1.6 times more likely to have stunted children than mothers who expressed positive attitudes about responsive feeding in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Thus, I rejected the null hypotheses. Please see the description of the model in Table 67 below.

Table 67

Variables in the Equation: Stunting and Mothers' Attitudes About Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on responsive feeding	.488	.246	3.923	1	.048	1.629	1.005	2.639
Mothers' literacy	.114	.338	.114	1	.735	1.121	.578	2.175
Familys' income	-.002	.001	4.937	1	.026	.998	.995	1.000
Constant	.016	.409	.001	1	.969	1.016		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 26.71, $p <$ .01, indicating that the model was able to distinguish between children who were chronically malnourished (stunted) and were not chronically malnourished (not stunted) in a new relationship. The model as a whole explained between 8.4 (Cox & Snell R square) to 11.1 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months in Afghanistan and correctly classified 60% of the cases. I found that 2 predictor variables made a significant contribution to the model. The strongest predictor was mothers' attitudes of meal frequency, where mothers who did not express positive attitudes to practicing meal frequency were 1.8 times more likely to have stunted children than mothers who expressed positive attitudes to practicing meal frequency in compliance with the WHO's guiding principles of complementary feeding. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 68 below.

Table 68

Variables in the Equation: Stunting and Mothers' Attitudes About Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	.273	.303	.809	1	.368	1.314	.725	2.381
Mothers' attitudes on diverse foods	.256	.274	.871	1	.351	1.291	.755	2.209
Mothers' attitudes on meal frequency	.599	.244	6.006	1	.014	1.820	1.127	2.939

Mothers' attitudes on safe prep of foods	.605	.310	3.809	1	.051	1.832	.997	3.364
Mothers' attitudes on vit and minerals	.167	.299	.310	1	.578	1.181	.657	2.123
Mothers' attitudes on feeding during and after illnesses	.014	.314	.002	1	.963	1.014	.548	1.877
Mothers' attitudes on responsive feeding	.328	.264	1.543	1	.214	1.388	.827	2.328
Mothers' literacy	-.155	.371	.175	1	.676	.856	.414	1.771
Family's income	-.003	.001	6.441	1	.011	.997	.995	.999
Constant	-.316	.439	.518	1	.471	.729		

Mothers' Attitudes About Complementary Infant Feeding and Wasting

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 12.38, p < .01, indicating that the model was able to distinguish between children who were wasted and were not wasted in a new relationship. The model as a whole explained between 4 (Cox & Snell R square) to 7.1 (Nagelkerke R squared) of the variance in wasting in children aged between 6 to 24 months in Afghanistan, and correctly classified 86% of the cases.

Based on the results of the Table 62, mothers' attitudes about introducing complementary foods was a statistically significant predictor, where mothers who did not express positive attitudes about introducing complementary foods in compliance with the WHO's guiding principles of breastfed child were 3.1 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods in compliance with the WHO's guiding principles of breastfed child .Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 69 below.

Table 69

Variables in the Equation: Wasting and Mothers' Attitudes About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	1.120	.360	9.692	1	.002	3.065	1.514	6.206
Mothers' literacy	.389	.568	.470	1	.493	1.476	.485	4.490
Family's income	-.003	.002	2.818	1	.093	.987	.993	1.001
Constant	-1.951	.636	9.409	1	.002	.142		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 5.98, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about food diversity in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 70 below.

Table 70

Variables in the Equation: Wasting and Mothers' Attitudes About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on diverse foods	.560	.334	2.809	1	.094	1.750	.910	3.367
Mothers' literacy	.396	.563	.494	1	.482	1.486	.493	4.484
Family's income	-.003	.002	2.154	1	.142	.997	.994	1.001
Constant	-1.983	.627	9.997	1	.002	.138		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 4.46, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about meal frequency in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 71 below.

Table 71

Variables in the Equation: Wasting and Mothers' Attitudes About Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp (B)	Lower	Upper
Mothers' attitudes on meal frequency	.380	.340	1.253	1	.263	1.463	.751	2.848
Mothers' literacy	.426	.564	.571	1	.450	1.532	.507	4.628
Family's income	-.002	.002	1.501	1	.220	.998	.994	1.001
Constant	-2.054	.649	10.021	1	.002	.128		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 4.41, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about safe preparation of complementary foods in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus,I failed to reject the null hypotheses. Please see the description of the model in Table 72 below.

Table 72

Variables in the Equation: Wasting and Mothers' Attitudes About Safe Preparation of Complementary Foods

	B	*S.E.*	Wald	*df*	*p*	Exp(B)	95% CI for EXP(B) Lower	Upper
Mothers' knowledge on safe preperation of CF	.414	.366	1.278	1	.258	1.513	.738	3.099
Mothers' literacy	.441	.563	.614	1	.433	1.556	.515	4.689
Family's Income	-.002	.002	1.577	1	.209	.998	.994	1.001
Constant	-1.937	.630	9.445	1	.002	.144		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.46, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about consuming vitamins and minerals by children in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 73 below.

Table 73

Variables in the Equation: Wasting and Mothers' Attitudes About Using Vitamin and Mineral Supplements

	B	*S.E.*	Wald	*df*	*P*	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Mothers' attitudes on vitamins and minerals	-.208	.388	.287	1	.592	.812	.380	1.738
Mothers' literacy	.579	.589	.964	1	.326	1.784	.562	5.662
Familys' income	-.002	.002	1.508	1	.220	.998	.994	1.001
Constant	-1.806	.637	8.047	1	.005	.164		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.19, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The results indicated that there was no statistically significant association between mothers' attitudes about feeding patterns during and after illnesses in compliance the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 74 below.

Table 74

Variables in the Equation: Wasting and Mothers' Attitudes About Feeding Pattern During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' attitudes on feeding pattern	.043	.409	.011	1	.917	1.043	.468	2.326
Mothers' literacy	.481	.561	.736	1	.391	1.618	.539	4.861
Familys' income	-.002	.002	1.524	1	.217	.998	.994	1.001
Constant	-1.881	.630	8.910	1	.003	.152		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 5.11, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about responsive feeding in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 75 below.

Table 75

Variables in the Equation: Wasting and Mothers' Attitudes About Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*p*	Exp(B)	Lower	Upper
Mothers' attitudes on responsive feeding	.505	.374	1.827	1	.176	1.657	.797	3.445
Mothers' literacy	.447	.563	.632	1	.427	1.564	.519	4.711
Familys' income	-.002	.002	1.671	1	.196	.998	.994	1.001
Constant	-2.177	.672	10.489	1	.001	.113		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 17.39, $p <$ .05, indicating that the model was able to distinguish between children who were acutely malnourished (wasted) and were not acutely malnourished (not wasted) in a new relationship. The model as a whole explained between 5.5 (Cox & Snell R square) to 9.8 (Nagelkerke R squared) of the variance in wasting in children aged between 6 to 24 months in Afghanistan, and correctly classified 86% of the cases. Based on the results of Table 61, I found that 1 predictor variables made a statistically significant contribution to the model. The strongest predictor was mothers' attitudes about introducing complementary foods to children at the right time, where mothers who did not express positive attitudes about introducing complementary foods in compliance with the WHO's guiding principles of breastfed child were 2.8 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods in compliance with the WHO guiding principles of breastfed child .Thus, I rejected the null hypotheses. Please see the description of the model in Table 76 below.

Table 76

Variables in the Equation: Wasting and Mothers' Attitudes About Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	1.036	.374	7.657	1	.006	2.818	1.353	5.869
Mothers' attitudes on diverse foods	.442	.386	1.315	1	.252	1.556	.731	3.314
Mothers' attitudes on meal frequency	.399	.354	1.271	1	.260	1.490	.745	2.982
Mothers' attitudes on safe prep of foods	.076	.394	.037	1	.848	1.079	.498	2.334
Mothers' attitudes on vit and minerals	-.625	.434	2.073	1	.150	.535	.229	1.253

Mothers' attitudes on feeding during and after illnesses	-.045	.433	.011	1	.917	.956	.410	2.232
Mothers' attitudes on responsive feeding	.375	.398	.887	1	.346	1.455	.667	3.178
Mothers' literacy	.540	.607	.791	1	.374	1.716	.522	5.642
Family's income	-.004	.002	3.379	1	.066	.996	.992	1.000
Constant	-2.246	.713	9.928	1	.002	.106		

Mothers' Attitudes about Complementary Infant Feeding and Underweight

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 20.53, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 6.5 (Cox & Snell R square) to 9.3 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 72 % of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' attitudes about introducing complementary foods to children at the right time were a statistically significant predictor, where mothers who did not express positive attitudes about introducing complementary foods in compliance with the WHO's guideline were 2.5 times more likely to have underweight children than mothers who expressed positive attitudes about introducing complementary foods in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.3 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 77 below.

Table 77

Variables in the Equation: Underweight and Mothers' Attitudes About the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	.933	.302	9.555	1	.002	2.542	1.407	4.594
Mothers' literacy	1.192	.503	5.612	1	.118	3.292	1.228	8.823
Family's income	-.002	.001	2.548	1	.110	.998	.995	1.001
Constant	-1.838	.548	11.238	1	.001	.159		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 20.43, $p < .001$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 6.5 (Cox & Snell R square) to 9.2 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' attitudes about introducing nutritionally diverse foods to children was a statistically significant predictor, where mothers who did not express positive attitudes about introducing nutritionally diversified foods in compliance with the WHO's guideline were 2.2 times more likely to have underweight children than mothers who expressed positive attitudes about introducing nutritionally diversified foods in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.1 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 78 below.

Table 78

Variables in the Equation: Wasting and Mothers' Attitudes About Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on diverse foods	.805	.265	9.230	1	.002	2.237	1.331	3.760
Mothers' literacy	1.130	.503	5.045	1	.025	3.094	1.155	8.291
Family's income	-.002	.001	2.698	1	.100	.998	.995	1.000
Constant	-1.921	.545	12.433	1	.001	.146		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 17.66, p < .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.6 (Cox & Snell R square) to 8 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' attitudes about meal frequency were a statistically significant predictor, where mothers who did not express positive attitudes about meal frequency in compliance with the WHO's guideline were 2 times more likely to have underweight children than mothers who expressed positive attitudes about meal frequency in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.2 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 79 below.

Table 79

Variables in the Equation: Underweight and Mothers' Attitudes About Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on meal frequency	.677	.268	6.392	1	.011	1.968	1.164	3.325
Mothers' literacy	1.160	.502	5.335	1	.021	3.191	1.192	8.543
Family's income	-.001	.001	1.279	1	.258	.999	.996	1.001
Constant	-2.098	.564	13.861	1	.000	.123		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 18.73, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.9 (Cox & Snell R square) to 8.5 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' attitudes about safe preparation of complementary foods were a statistically significant predictor where mothers who did not express positive attitudes about safe preparation of complementary foods in compliance with the WHO's guideline were 2.3 times more likely to have underweight children than mothers who expressed positive attitudes about safe preparation of complementary foods in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.2 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 80 below.

Table 80

Variables in the Equation: Underweight and Mothers' Attitudes About Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers'	.812	.291	7.792	1	.005	2.252	1.274	3.981

knowledge on safe preperation of CF								
Mothers' literacy	1.182	.502	5.543	1	.019	3.262	1.219	8.728
Family's income	-.002	.001	1.453	1	.228	.998	.996	1.001
Constant	-1.907	.549	12.069	1	.001	.149		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 18, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.7 (Cox & Snell R square) to 8.2 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. One predictor variable made a statistically significant contribution to the model. Mothers' attitudes about consuming vitamins and minerals by children were statistically significant predictor, where mothers who did not express positive attitudes about consuming vitamins and mineral by children were 2.4 times more likely to have underweight children than mothers who expressed positive attitudes about consuming vitamins and minerals by children. Please see the description of the model in Table 81 below.

Table 81

Variables in the Equation: Underweight and Mothers' Attitudes About Vitamin and Mineral Supplements

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for

							EXP(B)	
							Lower	Upper
Mothers' knowledge on vitamins and minerals	.895	.357	6.278	1	.012	2.448	1.215	4.930
Mothers' literacy	.883	.519	2.896	1	.089	2.417	.875	6.679
Family's income	-.002	.001	1.619	1	.203	.998	.996	1.001
Constant	-2.126	.571	13.848	1	.001	.119		

The model containing all predictor variables was statistically significant, χ^2 (3, *N* = 306) = 11.37, *p* < .05, indicating that the model was able to distinguish between children who were underweight and were not underweight. The model as a whole explained between 3.6 (Cox & Snell R square) to 5.2 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71 % of the cases. Mothers' education was a statistically significant predictor in the model, where illiterate mothers were 3.5 times more likely to have underweight children than literate mothers in Afghanistan. Please see the description of the model in Table 82 below.

Table 82

Variables in the Equation: Underweight and Mothers' Attitudes About Feeding Pattern During and After Illnesses

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for

							EXP(B)	
							Lower	Upper
Mothers' attitudes on feeding pattern	-.180	.330	.298	1	.585	.835	.437	1.595
Mothers' literacy	1.251	.499	6.296	1	.012	3.495	1.315	9.288
Familys' income	-.002	.001	1.433	1	.231	.998	.996	1.001
Constant	-1.731	.544	10.142	1	.001	.177		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3*, N* = 306) = 17, *p* < .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 5.4 (Cox & Snell R square) to 7.7 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Mothers' education was a statistically significant predictor in the model, where illiterate mothers were 3.3 times more likely to have underweight children than literate mothers in Afghanistan. Please see the description of the model in Table 83 below.

Table 83

Variables in the Equation: Underweight and Mothers' Attitudes About Responsive Feeding

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for EXP(B)

							Lower	Upper
Mothers' attitudes on responsive feeding	.690	.291	5.649	1	.017	1.995	1.129	3.525
Mothers' literacy	1.208	.501	5.813	1	.016	3.346	1.254	8.933
Familys' income	-.002	.001	1.577	1	.209	.998	.996	1.001
Constant	-2.191	.578	14.397	1	.000	.112		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 41.15, $p <$ .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 12.8 (Cox & Snell R square) to 18 (Nagelkerke R squared) of the variance in underweight in children aged between 6 to 24 months in Afghanistan, and correctly classified 74 % of the cases. I found that 2 predictor variables made a significant contribution to the model. The strongest predictor was mothers' attitudes about introducing complementary foods in compliance with the WHO's guideline, where mothers who did not have positive attitudes of introducing complementary foods at the right time to children were 2 times more likely to have underweight children than mothers who had positive attitudes about introducing complementary foods in compliance with the WHO's guideline. Mothers' attitudes about meal frequency was also a significant predictor, where mothers who did not have positive attitudes about meal frequency were 1.8 times more likely to have underweight children than mothers who had positive attitudes about meal frequency. Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 84 below.

Table 84

Variables in the Equation: Underweight and Mothers' Attitudes About Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' attitudes on introducing CF	.697	.318	4.799	1	.028	2.009	1.076	3.749
Mothers' attitudes on diverse foods	.413	.303	1.856	1	.173	1.512	.834	2.740
Mothers' attitudes on meal frequency	.573	.282	4.139	1	.042	1.774	1.021	3.082
Mothers' attitudes on safe prep of foods	.471	.318	2.200	1	.138	1.602	.859	2.986
Mothers' attitudes on vit and minerals	.585	.382	2.341	1	.126	1.795	.849	3.796
Mothers' attitudes	-.428	.356	1.450	1	.228	.652	.325	1.308

on feeding during and after illness								
Mothers' attitudes on responsive feeding	.473	.313	2.283	1	.131	1.605	.869	2.963
Mothers' literacy	.775	.533	2.117	1	.146	2.170	.764	6.164
Family's income	-.003	.001	3.828	1	.050	.997	.994	1.000
Constant	-2.670	.628	18.064	1	.001	.069		

Mothers' Practices of Complementary Infant Feeding and Stunting

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 19.59, p < .001, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 6.2 (Cox & Snell R square) to 8.3 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months and correctly classified 61% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' introducing complementary foods at the right time was a statistically significant predictor of stunting in children, where mothers who did not introduce complementary foods in compliance with the WHO's guideline were 2.4 times more likely to have stunted children than mothers who introduced complementary foods in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Please see the description of the model in Table 85 below.

Table 85

Variables in The Equation: Stunting and Mothers' Practices of the Right Time to Introduce Complementary Foods

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Mothers' practices of introducing CF	.871	.237	13.502	1	.001	2.388	1.501	3.800
Mothers' literacy	.112	.343	.107	1	.743	1.119	.571	2.191
Family's income	-.002	.001	4.432	1	.035	.998	.995	1.001
Constant	-.144	.408	.126	1	.723	.865		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 12.89, p < .01, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 4.1 (Cox & Snell R square) to 5.5 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 60% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of t food diversity was a statistically significant predictor of malnutrition in children, where mothers who did not feed their children nutritionally diversified foods in compliance with the WHO's guideline were 3 times more likely to have stunted children than mothers who fed their children nutritionally diversified foods in compliance with the WHO's guideline. Family income was also a statistically significant predictor of stunting in children, where one-unit (1 USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 86 below.

Table 86

Variables in the Equation: Stunting and Mothers' Practices of Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of diverse foods	1.103	.436	6.405	1	.011	3.015	1.283	7.085
Mothers' literacy	.014	.344	.014	1	.904	1.042	.531	2.047
Family's income	-.002	.001	4.213	1	.040	.998	.996	1.000
Constant	-.634	.538	1.387	1	.239	.530		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 21.45, $p < .01$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 6.8 (Cox

& Snell R square) to 9.0 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 63% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of meal frequency was a statistically significant predictor of malnutrition in children, where mothers who did not practice meal frequency were 2.9 times more likely to have stunted children than mothers who practiced meal frequency in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1 USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 87 below.

Table 87

Variables in the Equation: Stunting and Mothers' Practices of Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of meal frequency	1.047	.271	14.906	1	.001	2.848	1.674	4.846
Mothers' literacy	.014	.348	.002	1	.967	1.014	.513	2.005
Family's income	-.002	.001	4.423	1	.035	.998	.995	1.000
Constant	-.348	.429	.657	1	.418	.706		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 5.79, $p > .05$, indicating that the model was not able to distinguish between children who were stunted and were not stunted in a new relationship. Based on the results of the logistic regression model, I failed to reject the null hypotheses. Therefore, I concluded that there was no statistically significant association between mothers' practices of safe preparation of complementary foods and stunting. Please see the description of the model in Table 88 below.

Table 88

Variables in the Equation: Stunting and Mothers' Practices of Safe Preparation of Complementary Foods

							95% C.I.for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of safe preperation of CF	.040	.330	.014	1	.904	1.040	.545	1.985
Mothers' literacy	.147	.338	.188	1	.665	1.158	.597	2.246
Family's Income	-.002	.001	4.389	1	.036	.998	.995	1.000
Constant	.257	.470	.298	1	.585	1.293		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 8.03, $p < .05$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 2.6 (Cox & Snell R square) to 3.5 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 59% of the cases. One predictor variable made a statistically significant contribution to the model. The family income variable was a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 89 below.

Table 89

Variables in the Equation: Stunting and Mothers' Practices of Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of vits and minerals	.581	.391	2.209	1	.137	1.788	.831	3.849
Mothers' literacy	-.140	.391	.129	1	.719	.869	.404	1.869
Familys' income	-.002	.001	5.054	1	.025	.998	.995	1.000
Constant	.058	.416	.020	1	.889	1.060		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 10.32, p < .05, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 3.1(Cox & Snell R square) to 4.2 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 57% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of feeding pattern during and after illnesses was a statistically significant predictor of malnutrition in children, where mothers who did not practice appropriate feeding patterns during and after illnesses in compliance with the WHO's guideline were 1.8 times more likely to have stunted children than mothers who practiced appropriate feeding pattern during and after illnesses in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1 USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 90 below.

Table 90

Variables in the Equation: Stunting and Mothers' Practices of Feeding Pattern During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of feeding pattern	.579	.275	4.436	1	.035	1.785	1.041	3.059

Mothers' literacy	.069	.339	.042	1	.838	1.072	.551	2.084
Familys' income	-.003	.001	5.745	1	.017	.997	.995	1.000
Constant	.264	.384	.473	1	.491	1.302		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 26.2, p < .001, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. The model as a whole explained between 8.2 (Cox & Snell R square) to 10.9 (Nagelkerke R squared) of the variance in children's stunting, and correctly classified 63 % of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers practicing responsive feeding was a statistically significant predictor of malnutrition in children, where mothers who did not practice responsive feeding were 7.3 times more likely to have stunted children than mothers who practiced responsive feeding in compliance with the WHO's guideline. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted. Therefore, I rejected the null hypotheses. Please see the description of the model in Table 91 below.

Table 91

Variables in the Equation: Stunting and Mothers' Practices of Responsive Feeding

							95% CI for
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	EXP(B)

							Lower	Upper
Mothers' practices of responsive feeding	1.981	.512	14.965	1	.001	7.250	2.657	19.781
Mothers' literacy	-.202	.367	.303	1	.582	.817	.398	1.678
Familys' income	-.002	.001	4.056	1	.044	.998	.996	1.001
Constant	-1.223	.583	4.399	1	.036	.294		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 56.97, $p <$ .001, indicating that the model was able to distinguish between children who were chronically malnourished (stunted) and were not chronically malnourished (not stunted) in a new relationship. The model as a whole explained between 17 (Cox & Snell R square) to 22.2 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months in Afghanistan, and correctly classified 66% of the cases. Four predictor variables made a significant contribution to the model. The strongest predictor was mothers' practicing responsive feeding, where mothers who did not practice responsive feeding in compliance with the WHO's guiding principles of the breastfed child were 7.1 times more likely to have stunted children than mothers who practiced responsive feeding in compliance with the WHO's guiding principles of the breastfed child. The second predictor was mothers' practicing meal frequency, where mothers who did not practice meal frequency in compliance with the WHO's guideline were 2.4 times more likely to have stunted children than the mothers who practiced meal frequency. The third predictor was mothers' practicing the introduction of complementary foods, where mothers who did not introduce complementary foods in compliance with the WHO's guideline were 2.1 times more likely to have stunted children than mothers who introduced complementary foods in compliance with the WHO's guideline. Finally, the family income variable was a statistically significant predictor of malnutrition in children, where one-unit (I USD) increase in family's income was associated with a child being 0.99 times less likely to be stunted. Thus, based on the results of the logistic regression model, I rejected the null hypotheses Please see the description of the model in Table 92 below.

Table 92

Variables in the Equation: Stunting and Mothers' Practices of Complementary Infant Feeding

							95% C.I.for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of introducing CF	.778	.254	9.358	1	.002	2.177	1.322	3.583
Mothers' practices of diverse foods	.813	.488	2.773	1	.096	2.255	.866	5.875
Mothers' practices of meal frequency	.878	.292	9.061	1	.003	2.406	1.358	4.260

Mothers' practices on safe prep of foods	-.539	.410	1.726	1	.189	.583	.261	1.304
Mothers' practices of vit and minerals	-.110	.440	.062	1	.803	.896	.378	2.124
Mothers' practices of feeding during and after illnesses	.573	.306	3.519	1	.061	1.774	.975	3.229
Mothers' practices of responsive feeding	1.966	.557	12.456	1	.001	7.144	2.397	21.288
Mothers' literacy	-.396	.441	.806	1	.369	.673	.283	1.598
Family's income	-.003	.001	5.125	1	.024	.997	.995	1.000
Constant	-2.348	.746	9.904	1	.002	.096		

Mothers' Practices of Complementary Infant Feeding and Wasting

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.25, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The results indicated that there was no statistically significant association between mothers' practices of introducing complementary foods in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 93 below.

Table 93

Variables in the Equation: Wasting and Mothers' Practices of The Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of introducing CF	-.090	.328	.075	1	.784	.914	.480	1.739
Mothers' literacy	.489	.561	.761	1	.383	1.631	.543	4.899
Family's income	-.002	.002	1.567	1	.211	.998	.994	1.001
Constant	-1.828	.644	8.058	1	.005	.161		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.48, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' practices of food diversity in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 94 below.

Table 94

Variables in the Equation: Wasting and Mothers' Practices of Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of diverse foods	.338	.638	.280	1	.597	1.402	.401	4.899
Mothers' literacy	.453	.563	.647	1	.421	1.573	.522	4.742
Family's income	-.002	.002	1.497	1	.221	.998	.994	1.001
Constant	-2.160	.835	6.698	1	.010	.115		

The model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.33, p > .05, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. There was no statistically significant association between mothers' practices of meal frequency and wasting in children aged between 6 to 24 months. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 95 below.

Table 95

Variables in the Equation: Wasting and Mothers' Practices of Meal Frequency

	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	95% CI for EXP(B)

							Lower	Upper
Mothers' practices of meal frequency	.143	.362	.156	1	.693	.867	.426	1.762
Mothers' literacy	.504	.563	.800	1	.371	1.655	.549	4.992
Family's income	-.002	.002	1.570	1	.210	.998	.994	1.001
Constant	-1.786	.660	7.319	1	.007	.168		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.35, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The results indicated that there was no statistically significant association between mothers' practices of safe preparation of complementary foods in compliance the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 96 below.

Table 96

Variables in the Equation: Wasting and Mothers' Practices of Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices	.214	.519	.171	1	.679	1.239	.448	3.426

of safe preperation of CF								
Mothers' literacy	.455	.565	.650	1	.420	1.577	.521	4.772
Family's Income	-.002	.002	1.333	1	.248	.998	.994	1.001
Constant	-2.053	.767	7.166	1	.007	.128		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 4.28, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' attitudes about consuming vitamins and minerals by children in compliance the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 97 below.

Table 97

Variables in the Equation: Wasting and Mothers' Practices of Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of vitamins and	-.576	.522	1.161	1	.281	.570	.205	1.585

minerals								
Mothers' literacy	.797	.642	1.541	1	.215	2.218	.613	7.801
Familys' income	-.002	.002	1.443	1	.230	.998	.994	1.001
Constant	-1.680	.642	6.846	1	.009	.186		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.18, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' practices of feeding patterns during and after illnesses in compliance with the WHO's guideline and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 98 below.

Table 98

Variables in the Equation: Wasting and Mothers' Practices of Feeding Pattern During and After Illnesses

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of feeding pattern	.023	.380	.004	1	.952	.977	.464	2.058
Mothers' literacy	.487	.563	.747	1	.387	1.627	.540	4.906

Familys' income	-.002	.002	1.529	1	.216	.998	.994	1.001
Constant	-1.870	.626	8.940	1	.003	.154		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (3, N = 306) = 3.19, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' practices of responsive feeding in compliance with the WHO's guiding principles of breastfed child and wasting in children aged between 6 to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 99 below.

Table 99

Variables in the Equation: Wasting and Mothers' Practices of Responsive Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of responsive feeding	.075	.576	.017	1	.896	1.078	.348	3.334
Mothers' literacy	.469	.572	.671	1	.413	1.598	.521	4.902
Familys' income	-.002	.002	1.526	1	.217	.998	.994	1.001
Constant	-1.929	.761	6.423	1	.011	.145		

The results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 5.16, $p > .05$, indicating that the model was not able to distinguish between children who were acutely malnourished (wasted) and were not acutely malnourished (wasted) in a new relationship. The study results indicated that there was no statistically significant association between mothers' practices of complementary infant feeding in compliance with the WHO's guideline and acute malnutrition (wasting) in children aged between 6 months to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses. Please see the description of the model in Table 100 below.

Table 100

Variables in the Equation: Wasting and Mothers' Practices of Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of introducing CF	-.068	.336	.040	1	.841	.935	.484	1.806
Mothers' practices of diverse foods	.493	.689	.511	1	.475	1.637	.424	6.317
Mothers' practices of meal frequency	-.135	.376	.129	1	.720	.874	.419	1.825

Mothers' practices of safe prep of foods	.080	.551	.021	1	.884	1.084	.368	3.189
Mothers' practices of vit and minerals	-.643	.557	1.333	1	.248	.526	.177	1.566
Mothers' practices of feeding during and after illness	.054	.387	.019	1	.890	1.055	.494	2.255
Mothers' practices of responsive feeding	.107	.606	.031	1	.859	1.113	.340	3.648
Mothers' literacy	.782	.651	1.444	1	.230	2.186	.611	7.824
Family's income	-.002	.002	1.306	1	.253	.998	.994	1.001
Constant	-2.108	.956	4.866	1	.027	.121		

Mothers' Practices of Complementary Infant Feeding and Underweight

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 23.7, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 7.5 (Cox & Snell R square) to 10.6 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of introducing complementary foods to children at the right time were a statistically significant predictor, where mothers who did not introduce complementary foods in compliance with the WHO's guideline were 2.6 times more likely to have underweight children than mothers who introduced complementary foods in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.4 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 101 below.

Table 101

Variables in the Equation: Underweight and Mothers' Practices of the Right Time to Introduce Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*P*	Exp(B)	Lower	Upper
Mothers' practices of introducing CF	.940	.271	11.999	1	.001	2.561	1.504	4.360
Mothers' literacy	1.232	.505	5.957	1	.015	3.430	1.275	9.227
Family's income	-.001	.001	1.118	1	.290	.999	.996	1.001
Constant	-2.324	.580	16.067	1	.000	.098		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 19.25, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 6.1 (Cox & Snell R square) to 8.7 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of feeding children nutritionally diverse foods were a statistically significant predictor, where mothers who did not feed their children nutritionally diversified foods in compliance with the WHO's guideline were 5.6 times more likely to have underweight children than mothers who fed their children nutritionally diversified foods in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.2 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 102 below.

Table 102

Variables in the Equation: Underweight and Mothers' Practices of Nutritionally Diverse Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' practices of diverse foods	1.725	.749	5.302	1	.021	5.610	1.293	24.349
Mothers' literacy	1.149	.503	5.229	1	.022	3.155	1.178	8.449

Family's income	-.001	.001	1.171	1	.279	.999	.996	1.001
Constant	-3.316	.896	13.695	1	.001	.036		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 21.5, $p < .001$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 6.7 (Cox & Snell R square) to 9.8 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. I found that 2 predictor variables made a statistically significant contribution to the model. Mothers' practices of meal frequency were a statistically significant predictor, where mothers who did not practice meal frequency in compliance with the WHO's guideline were 2.8 times more likely to have underweight children than mothers who practiced meal frequency in compliance with the WHO's guideline. Mothers' education was also a statistically significant predictor, where illiterate mothers were 3.2 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 103 below.

Table 103

Variables in the Equation: Underweight and Mothers' Practices of Meal Frequency

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper

Mothers' practices of meal frequency	1.021	.337	9.188	1	.002	2.775	1.434	5.368
Mothers' literacy	1.153	.504	5.230	1	.022	3.168	1.179	8.508
Family's income	-.001	.00	1.184	1	.277	.999	.996	1.001
Constant	-2.480	.607	16.678	1	.001	.086		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 11.29, p < .05, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 3.6 (Cox & Snell R square) to 5.2 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71 % of the cases. One predictor variable made a statistically significant contribution to the model. Mothers' education was a statistically significant predictor, where illiterate mothers were 3.6 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 104 below.

Table 104

Variables in the Equation: Underweight and Mothers' Practices of Safe Preparation of Complementary Foods

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper

Mothers' practices of safe preperation of CF	-.179	.374	.228	1	.633	.836	.402	1.741
Mothers' literacy	1.267	.502	6.385	1	.012	3.551	1.329	9.490
Family's income	-.002	.001	1.502	1	.220	.998	.996	1.001
Constant	-1.616	.622	6.756	1	.009	.199		

A stepwise regression analysis was performed to assess if there is a statistically significant association between mothers' practices of consuming vitamins and minerals by children and underweight. Mothers' practices of consuming vitamins and mineral by children were entered as a predictor variable into the model first. The results indicated that the model containing mother's practices of consuming vitamins and minerals by children as a predictor variable was statistically significant, χ^2 (3, N = 306) = 8.58, $p <$ .01, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 2.8 (Cox & Snell R square) to 3.9 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Mothers' practices of consuming vitamins and minerals by children as a predictor variable made a statistically significant contribution to the model, where mothers who did not practice consuming vitamins and minerals by children were 3.6 times more likely to have underweight children than mothers who practiced consuming vitamins and minerals by children. Please see the description of the model containing only 1 predictor variable in Table 105 below.

Table 105

Variables in the Equation: Underweight and Mothers' Practices of Vitamin and Mineral Supplements

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' practices of vitamins and minerals	1.272	.494	6.632	1	.010	3.566	1.355	9.387
Constant	-2.028	.476	18.175	1	.001	.132		

In the second step of the stepwise logistic regression, mothers' education and family's income as covariate variables were also added to the equation. The results indicated that there was no statistically significant association between mothers' practices of consuming vitamins and mineral by children wasting and underweight in children aged between 6 to 24 months. Please see the description of the model in Table 106 below.

Table 106

Variables in the Equation: Underweight and Mothers' Practices of Vitamin and Mineral Supplements

	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	95% CI for EXP(B)

							Lower	Upper
Mothers' practices of vitamins and minerals	.888	.536	2.740	1	.098	2.430	.849	6.950
Mothers' literacy	.855	.541	2.502	1	.114	2.351	.815	6.783
Familys' income	-.002	.001	1.534	1	.216	.998	.996	1.001
Constant	-2.199	.629	12.240	1	.001	.111		

The results of the logistic regression model indicated that the model containing all predictor variables was statistically significant, χ^2 (3, N = 306) = 11.95, $p < .01$, indicating that the model was able to distinguish between children who were underweight and who were not . The model as a whole explained between 3.8 (Cox & Snell R square) to 5.5 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Mothers' education was a statistically significant predictor, where illiterate mothers were 3.6 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 107 below.

Table 107

Variables in the Equation: Underweight and Mothers' Practices of Feeding Pattern During and After Illnesses

	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	95% CI for EXP(B)

							Lower	Upper
Mothers' practices of feeding pattern	-.281	.302	.865	1	.352	.755	.417	1.366
Mothers' literacy	1.283	.501	6.568	1	.010	3.608	1.352	9.626
Familys' income	-.001	.001	1.118	1	.290	.999	.996	1.001
Constant	-1.750	.542	10.421	1	.001	.174		

The model containing all predictor variables was statistically significant, χ^2 (3, *N* = 306) = 16.97, $p < .01$, indicating that the model was able to distinguish between children who were underweight and were not underweight. The model as a whole explained between 5.4 (Cox & Snell R square) to 7.7 (Nagelkerke R squared) of the variance in children's being underweight, and correctly classified 71% of the cases. Two predictor variables made a statistically significant contribution to the model. Mothers' practices of responsive feeding was a statistically significant predictor of underweight in children, where mothers who did not practice responsive feeding were 3.8 times more likely to have underweight children than mothers who practiced responsive feeding. Mothers' education was also a statistically significant predictor, where illiterate mothers were 2.9 times more likely to have underweight children than literate mothers. Please see the description of the model in Table 108 below.

Table 108

Variables in the Equation: Underweight and Mothers' Practices of Responsive Feeding

	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	95% CI for

							EXP(B)	
							Lower	Upper
Mothers' practices of responsive feeding	1.322	.628	4.430	1	.035	3.751	1.095	12.846
Mothers' literacy	1.068	.506	4.447	1	.035	2.908	1.078	7.843
Familys' income	-.001	.001	1.053	1	.305	.999	.996	1.001
Constant	-2.858	.784	13.286	1	.001	.057		

The results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 44.64, $p <$ .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. The model as a whole explained between 13.6 (Cox & Snell R square) to 19.4 (Nagelkerke R squared) of the variance in underweight in children aged between 6 to 24 months in Afghanistan, and correctly classified 70% of the cases. Based on the results of Table 94, 2 predictor variables made a statistically significant contribution to the model. The strongest predictor was mothers' practices of meal frequency, where mothers who did not practice meal frequency in compliance with the WHO's guideline were 2.4 times more likely to have underweight children than mothers who practiced meal frequency in compliance with the WHO guideline. Introducing complementary foods at the right time to children was also a statistically significant predictor, where mothers who did not introduce complementary foods at the right time to children were 2.2 times more likely to have underweight children than mothers who introduced complementary foods at the right time to children. Based on the results of the logistic regression model, I rejected the null hypotheses. Please see the description of the model in Table 109 below.

Table 109

Variables in the Equation: Underweight and Mothers' Practices of Complementary Infant Feeding

							95% CI for EXP(B)	
	B	*S.E.*	Wald	*Df*	*p*	Exp(B)	Lower	Upper
Mothers' practices of introducing CF	.803	.283	8.041	1	.005	2.232	1.282	3.889
Mothers' practices of diverse foods	1.447	.779	3.449	1	.063	4.249	.923	19.557
Mothers' practices of meal frequency	.880	.358	6.062	1	.014	2.412	1.197	4.861
Mothers' practices of safe prep of foods	-.690	.436	2.508	1	.113	.501	.213	1.178
Mothers' practices of vit and minerals	.384	.580	.438	1	.508	1.468	.471	4.573
Mothers' practices	-.478	.324	2.175	1	.140	.620	.328	1.170

of feeding during								
and after illnesses								
Mothers’ practices	1.168	.666	3.074	1	.080	3.215	.871	11.859
of responsive								
feeding								
Mothers’ literacy	.914	.590	2.401	1	.121	2.494	.785	7.925
Family’s income	-.001	.001	1.095	1	.295	.999	.996	1.001
Constant	-4.706	1.122	17.597	1	.001	.009		

Summary

This cross-sectional research study is based on the three research questions and their corresponding hypotheses. This summary section presented a mixed of descriptive and inferential statistics in response to the three research questions and their corresponding hypotheses. Summarizing the descriptive statistics, the prevalence of stunting was 51% among children aged between 6 to 24 months. The prevalence of wasting was 14% and the prevalence of underweight was 29%. The results of this research study also indicated that on average, 38% of mothers had knowledge about complimentary infant feeding. On average, 57% of mothers expressed positive attitudes about practicing complementary infant feeding, and 28% of mothers practiced complementary infant feeding in compliance with the WHO’s guideline.

The first research question was “What is the association between mothers’ knowledge about complementary infant feeding and malnutrition in children?”

Examining the association between mothers' knowledge about complementary infant feeding and chronic malnutrition (stunting) in children, the results indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 45.33, $p < .001$, indicating that the model as a whole was able to distinguish between children who were stunted and were not stunted in a new relationship. Three predictor variables made a significant contribution to the model. The strongest predictor was mothers' knowledge about food diversity, where mothers who did not have knowledge of food diversity were 2.3 times more likely to have stunted children than mothers who had knowledge about food diversity. Mothers' knowledge of meal frequency was also a statistically significant predictor, where mothers who did not have knowledge about meal frequency were 2.2 times more likely to have stunted children than mothers who had knowledge about meal frequency. Finally, mothers' knowledge about introducing complementary foods at the right time was a statistically significant predictor of stunting in children, where mothers who did not have knowledge about introducing complementary foods at the right time were 1.7 times more likely to have stunted children than mothers who had knowledge about introducing complementary foods at the right time. Thus, the null hypothesis was rejected.

Examining the association between mothers' knowledge about complementary feeding and wasting in children, the results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 10.95, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' knowledge about complementary infant feeding and wasting in children aged between 6 months to 24 months in Afghanistan. Thus, I failed to reject the null hypothesis.

Examining the association between mother's knowledge about complementary feeding and underweight, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 37.49, p < .001, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. Two predictor variables made a significant contribution to the model. The strongest predictor was mothers' knowledge about introducing complementary foods to children at the right time, where mothers who did not have knowledge of introducing complementary foods at the right time to children were 2.2 times more likely to have underweight children than mothers who had knowledge about introducing complementary foods at the right time to children. Mothers' knowledge about meal frequency was also a significant predictor where mothers who did not have knowledge about meal frequency were 2.2 times more likely to have underweight children than mothers who had knowledge about meal frequency. Thus, the null hypothesis was rejected.

The second research question was "What is the association between mothers' attitudes about complementary infant feeding and malnutrition in children?" Examining the association between mothers' attitudes of complementary infant feeding and stunting in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 26.71, p <

.01, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. Three predictor variables made a significant contribution to the model. The strongest predictor was mothers' attitudes of meal frequency, where mothers who did not express positive attitudes to practicing meal frequency were 1.8 times more likely to have stunted children than mothers who expressed positive attitudes to practicing meal frequency. The family income variable was also a statistically significant predictor of stunting in children, where one-unit (1 USD) increase in family income was associated with a child being .99 times less likely to be stunted. Thus, the null hypothesis was rejected.

Examining the association between mothers' attitudes of complementary infant feeding and wasting in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9*, N* = 306) = 17.39, $p < .05$, indicating that the model was able to distinguish between children who were wasted and were not wasted in a new relationship. One predictor variables made a statistically significant contribution to the model. The strongest predictor was mothers' attitudes about introducing complementary foods to children at the right time, where mothers who did not express positive attitudes about introducing complementary foods at the right time were 2.8 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods to children at the right time. Thus, the null hypothesis was rejected.

Examining the association between mothers' attitudes of complementary infant feeding and underweight in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 41.15, $p < .001$, indicating that the model was able to distinguish between children who were underweight and were not underweight in a new relationship. Two predictor variables made a significant contribution to the model. The strongest predictor was mothers' attitudes about introducing complementary foods to children, where mothers who did not have positive attitudes of introducing complementary foods at the right time to children were 2 times more likely to have underweight children than mothers who had positive attitudes about introducing complementary foods to children at the right time. Mothers' attitudes about meal frequency was also a significant predictor, where mothers who did not have positive attitudes about meal frequency were 1.8 times more likely to have underweight children than mothers who had positive attitudes about meal frequency. Thus, the null hypothesis was rejected.

The third research question was "What is the association between mothers' practices of complementary feeding and malnutrition in children?" Examining the association between mothers' practices of complementary infant feeding and stunting in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 56.97, $p < .001$, indicating that the model was able to distinguish between children who were stunted and were not stunted in a new relationship. Four predictor variables made a significant contribution to the model. The strongest predictor was mothers' practicing responsive feeding, where mothers who did not practice responsive feeding were 7.1 times more likely to have stunted children than mothers who practiced responsive. The second predictor was mothers' practicing meal frequency, where mothers who did not practice meal frequency were 2.4 times more likely to have stunted children than the mothers who practiced meal frequency. The third predictor was mothers' practicing the introduction of complementary foods, where mothers who did not introduce complementary foods to children at the right time were 2.1 times more likely to have stunted children than mothers who introduced complementary foods to children at the right time. Finally, the family income variable was a statistically significant predictor of malnutrition in children, where one-unit (I USD) increase in family's income was associated with a child being 0.99 times less likely to be stunted. Thus, the null hypothesis was rejected.

Examining the association between mothers' practices of complementary infant feeding and wasting in children, the results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 5.16, $p > .05$, indicating that the model was not able to distinguish between children who were wasted and were not wasted in a new relationship. The study results indicated that there was no statistically significant association between mothers' practices of complementary infant feeding and wasting in children aged between 6 months to 24 months in Afghanistan. Thus, I failed to reject the null hypotheses.

Examining the association between mothers' practices of complementary infant feeding and underweight in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 44.64, $p < .001$. The model was able to distinguish between children who were underweight and were not underweight in a new relationship. Two predictor variables made a statistically significant contribution to the model. The strongest predictor was mothers' practices of meal frequency, where mothers who did not practice meal frequency were 2.4 times more likely to have underweight children than mothers who practiced meal frequency. Introducing complementary foods at the right time to children was also a statistically significant predictor, where mothers who did not introduce complementary foods at the right time to children were 2.2 times more likely to have underweight children than mothers who introduced complementary foods at the right time to children. Thus, the null hypothesis was rejected.

Using the chi square tests for independence and logistic regression modeling, I concluded that mothers' knowledge, attitudes, and practices of complementary feeding were statistically significant predictors of stunting and underweight in children. Moreover, mothers' attitudes about complementary feeding were statistically significant predictors of wasting. Specifically, mothers' knowledge, attitudes, and practices of introducing complementary foods to children, meal frequency, food diversity and responsive feeding in compliance with the WHO's guideline were statistically significant predictors of stunting, and underweight in children. Whereas, mothers' knowledge and practices of complementary feeding were not statistically significant predictors of wasting in children in Afghanistan.

Chapter 5: Discussion, Conclusion, and Recommendation

Introduction

I applied a quantitative cross-sectional design to determine the association between mothers' knowledge, attitudes, and practices regarding complementary infant feeding and malnutrition in children in Afghanistan. The purpose of this research study was to gather valid and reliable information on the levels of mothers' knowledge, attitudes, and practices of complementary infant feeding. Moreover, I aimed to assist the Afghan Ministry of Health employees in making informed policy decisions. Finally, the findings of this research may be used to plan and operationalize public nutrition and behavior change programs to prevent malnutrition rates in Afghanistan.

In this research study, I addressed the problem of malnutrition that threatens physical, mental, and behavioral well-being of children. This public health problem needs to be dealt with seriously. This research study was the first quantitative cross-sectional study conducted in Afghanistan to determine the association between mother's knowledge, attitudes, and practices regarding complementary infant feeding in compliance with the WHO's guideline. My study adds to the body of literature to address the problem of malnutrition in Afghanistan.

In total, 306 mothers and their children aged between 6 to 24 months participated in this research study. The study demonstrated that 51% of children were stunted, 29% of children were underweight, and 14% of children were wasted. On average, 38% of mothers had appropriate knowledge about complementary infant feeding, 57% of mothers expressed positive attitudes about complementary feeding, and 28% practiced complementary infant feeding in compliance with the WHO's guideline in Afghanistan. Running the logistic regression model to determine the association between mothers' knowledge about complementary infant feeding and stunting in children, the model was statistically significant, χ^2 (9, N = 306) = 45.33, $p < .001$. The strongest predictor was mothers' knowledge about food diversity where mothers who did not have knowledge about food diversity were 2.3 times more likely to have stunted children than mothers who had knowledge about food diversity. Mothers' knowledge about complementary infant feeding and underweight was statistically significant, χ^2 (9, N = 306) = 37.49, $p < .001$. Mothers' knowledge about introducing complementary foods at the right time and meal frequency were statistically significant predictors of underweight. Mothers who did not have knowledge about introducing complementary foods at the right time and meal frequency were 2.2 times more likely to have underweight children than mothers who had knowledge about introducing complementary foods at the right time and meal frequency in compliance with the WHO's guideline. Assessing the association between mothers' knowledge about complementary feeding and wasting in children, the results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 10.95, $p > .05$.

Assessing the association between mothers' attitudes about complementary feeding and stunting, the results of logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 17.39, $p < .05$. The strongest predictor was mothers' attitudes about introducing complementary foods to children at the right time, where mothers who did not express positive attitudes about introducing complementary foods at the right time were 2.8 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods at the right time to children.

Assessing the association between mothers' attitudes about complementary infant feeding and underweight in children, the results of the logistic regression indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 41.15, $p < .001$.The strongest predictor was mothers' attitudes about introducing complementary foods to children, where mothers who did not express positive attitudes about introducing complementary foods at the right time to children were 2 times more likely to have underweight children than mothers who expressed positive attitudes about introducing complementary foods at the right time to children. Mothers' attitudes about meal frequency was also a significant predictor, where mothers who did not express positive attitudes about meal frequency were 1.8 times more likely to have underweight children than mothers who expressed positive attitudes about meal frequency.

Assessing mothers' attitudes about complementary infant feeding and wasting in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 17.39, $p <$ .05. The strongest predictor was mothers' attitudes about introducing complementary foods at the right time to children, where mothers who did not express positive attitudes about introducing complementary foods at the right time were 2.8 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods to children at the right time.

Assessing the association between mothers' practices of complementary infant feeding and stunting in children, the results of the logistic regression model indicated that the full model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 56.97, $p < .001$. The strongest predictor was mothers' practicing about responsive feeding, where mothers who did not practice responsive feeding were 7.1 times more likely to have stunted children than mothers who practiced responsive feeding. The second predictor was mothers' practicing meal frequency, where mothers who did not practice meal frequency were 2.4 times more likely to have stunted children than mothers who practiced meal frequency. The third predictor was mothers' practicing the introduction of complementary foods, where mothers who did not introduce complementary foods to children at the right time were 2.1 times more likely to have stunted children than mothers who introduced complementary foods at the right time to children.

Assessing the association between mothers' practices of complementary infant feeding and wasting in children, the results of the logistic regression model indicated that the model containing all predictor variables was not statistically significant, χ^2 (9, N = 306) = 5.16, $p > .05$. Finally, assessing the association between mothers' practices of complementary infant feeding and underweight, the logistic regression model containing all predictor variables was statistically significant, χ^2 (9, N = 306) = 44.64, $p < .001$.

Mothers who did not practice meal frequency were 2.4 times more likely to have underweight children than mothers who practiced meal frequency.

Introducing complementary foods at the right time to children was also a statistically significant predictor, where mothers who did not introduce complementary foods at the right time to children were 2.2 times more likely to have underweight children than mothers who introduced complementary foods at the right time to their children.

Interpretation of Findings

The purpose of this cross-sectional study was to determine the association between mothers' knowledge, attitudes, and practices of complementary feeding and malnutrition in children aged 6 to 24 months in Afghanistan.

The transitions from breastmilk to complementary foods typically started at the age of 6 months, such transition of a child from breastmilk to complementary foods is referred to as complementary feeding. The term *malnutrition* is referred to as undernutrition and overnutrition. *Malnutrition* may result from eating a diet which is deficient in nutrients or has too many nutrients.

Malnutrition is classified as chronic (stunting), acute (wasting) and underweight. Stunting is a condition that either a child does not eat enough foods or eats foods which are nutritionally deficient for a longer period of time. Thus, the child height is affected and he/she can be shorter for his/her age. Wasting is a condition that a child does not eat nutritional diet recently. Thus, the child can be thinner for his/her age. Underweight is a condition that a child is thinner for his/her age.

The target age for complementary infant feeding is typically defined to be 6 to 24 months of age. Practicing appropriate complementary infant feeding is defined as seven principles. These principles are referred to: 1) Introducing complementary foods to infants at the age of 6 months, this principle is based on the scientific rationale that breastmilk would no longer meet the nutritional requirements of the infants at the age of 6 months. 2) Meal frequency, this principle refers to increasing the number of feeding to meet the nutritional requirements of a child as he/she gets older. 3) Food diversity, this principle focuses on feeding children nutritionally diverse foods to meet their nutritional requirements. 4) Safe preparation of complementary foods, this principle focuses on the proper handling of complementary foods as well as the practice of hygiene norms while preparing and serving complementary foods to children. 5) Use of vitamins and minerals, this principle focuses on consuming certain vitamins and minerals consumed by children to meet their nutrient intake at the age of 6 to 24 months. 6) Feeding patterns during and after illnesses, this principle focuses on increasing the patterns of feeding during and after illnesses given the fact that during and after illnesses, children require more fluid and nutrients than normal. 7) Responsive feeding, this principle focuses on mothers' practicing good psycho-social care while feeding infants and children.

To address the research questions and hypotheses, I applied the chi square tests and logistic regression modelings in this research study.

Research Question 1

What is the association between mothers’ knowledge about complementary feeding and malnutrition in children?

The results indicated that mothers' knowledge about complementary feeding was a significant predictor of stunting in children, $\chi2$ (9, $N = 306$) = 45.33, $p < .001$. The strongest predictor was mothers' knowledge about food diversity, where mothers who did not have knowledge about food diversity were 2.3 times more likely to have stunted children than mothers who had knowledge about food diversity in Afghanistan. Mothers' knowledge of meal frequency was also a statistically significant predictor, where mothers who did not have knowledge about meal frequency were 2.2 times more likely to have stunted children than mothers who had knowledge about meal frequency. Finally, mothers' knowledge about introducing complementary foods was a statistically significant predictor of stunting in children, where mothers who did not have knowledge about introducing complementary foods to children were 1.7 times more likely to have stunted children than mothers who had knowledge about introducing complementary foods to children.

I found that mother's knowledge about complementary feeding was also a statistically significant predictor of underweight in children, $\chi2$ (9, $N = 306$) = 37.49, $p < .001$. Specifically, mothers' knowledge about introducing complementary foods and meal frequency were statistically significant predictors of underweight in children. Mothers who did not have knowledge about introducing complementary foods were 2.2 times more likely to have underweight children than mothers who had knowledge about introducing complementary foods at the right time to children. Moreover, mothers who did not have knowledge about meal frequency were 2.2 times more likely to have underweight children than mothers who had knowledge about meal frequency.

Mothers' knowledge about complementary feeding was not a statistically significant predictor of wasting in children, $\chi2$ (9, $N = 306$) = 10.95, $p > .05$.

Research Question 2

What is the association between mothers' attitudes about complementary feeding and malnutrition in children?

I found that mothers' attitudes about complementary feeding were statistically significant predictors of stunting in children, $\chi2$ (9, $N = 306$) = 26.71, $p < .01$, specifically, mothers' attitudes about meal frequency and family income were statistically significant predictors of stunting in children. Mothers who did not express positive attitudes to practicing meal frequency were 1.8 times more likely to have stunted children than mothers who expressed positive attitudes to practicing meal frequency. The family income variable was also a statistically significant predictor of stunting in children. One unit (1USD) increase in family income was associated with a child being .99 times less likely to be stunted.

Mothers' attitudes about complementary was statistically significant predictor of underweight in children, $\chi2$ (9, $N = 306$) = 41.15, $p < .001$. Specifically, 2 explanatory variables including mothers' attitudes about introducing complementary foods and meal frequency were statistically significant predictors of underweight in children. The results indicated that mothers who did not express positive attitudes about introducing complementary foods to children were 2 times more likely to have underweight children than mothers who expressed positive attitudes about introducing complementary foods to children. Moreover, mothers who did not express positive attitudes about meal frequency were 1.8 times more likely to have underweight children than mothers who expressed positive attitudes about meal frequency.

Mothers' attitudes about complementary infant feeding were statistically significant predictors of wasting in children, $\chi2$ (9, N = 306) = 17.39, $p < .05$. The results indicated that mothers' attitudes about introducing complementary foods to children were statistically significant predictors of wasting in children. Mothers who did not express positive attitudes about introducing complementary foods to children were 2.8 times more likely to have wasted children than mothers who expressed positive attitudes about introducing complementary foods to children in Afghanistan.

Research Question 3

What is the association between mothers' practices of complementary feeding and malnutrition in children?

Mothers' practices of complementary infant feeding was a statistically significant predictor of stunting and the model was statistically significant, $\chi2$ (9, N = 306) = 56.97, $p < .001$. Four variables explanatory were statistically significant predictors of stunting in children. The strongest predictor of stunting was mothers' practicing responsive feeding, where mothers who did not practice responsive feeding were 7.1 times more likely to have stunted children than mothers who practiced responsive feeding. Mothers' practicing meal frequency was also a statistically significant predictor of stunting, where mothers who did not practice meal frequency were 2.4 times more likely to have stunted children than the mothers who practiced meal frequency. The third predictor was mothers' practicing the introduction of complementary foods, where mothers who did not introduce complementary foods to children were 2.1 times more likely to have stunted children than mothers who introduced complementary foods to children. Finally, the family income variable was a statistically significant predictor of malnutrition in children, where one-unit (I USD) increase in family's income was associated with a child being 0.99 times less likely to be stunted.

Mothers' practices of complementary feeding was a statistically significant predictor of underweight in children and the model was statistically significant, $\chi2$ (9, N = 306) = 44.64, $p < .001$. Specifically, mothers practicing meal frequency and introducing complementary foods were statistically significant predictors of underweight in children. The results indicated that mothers who did not practice meal frequency were 2.4 times more likely to have underweight children than mothers who practiced meal frequency. Moreover, mothers who did not introduce complementary foods at the age of 6 months to children were 2.2 times more likely to have underweight children than mothers who introduced complementary foods at the age of 6 months to children.

Mothers' practices of complementary feeding were not a statistically significant predictor of wasting, $\chi2$ (9, N = 306) = 5.16, $p > .05$. I found that was no statistically significant association between mothers' practices of complementary feeding and wasting in children in Afghanistan.

Finally, I found that mothers' education and family income covariates were statistically significant predictors of malnutrition in children. The family income covariate was a statistically significant predictor of stunting, where one-unit (I USD) increase in family's income was associated with a child being 0.99 times less likely to be stunted in Afghanistan. Mothers' education as a covariate was also a statistically significant predictor of underweight, $\chi2$ (3, N = 306) = 19.25, $p < .001$. Illiterate mothers were 3.2 times more likely to have underweight children than literate mothers in Afghanistan.

I also applied the PAPM to understand maternal KAP about complementary feeding in Afghanistan. The PAPM was an appropriate theoretical framework to understand mothers' knowledge, attitudes, and practices of complementary infant feeding in Afghanistan. The PAPM was not only used to serve as an overarching theoretical framework to craft and conduct this research study but also to understand mothers' knowledge, attitudes, and practices of complementary infant feeding in Afghanistan. The constructs of the PAPM are organized around seven transformational stages. The first and second constructs of the PAPM were applied to understand if mothers have ever heard of or think of complementary infant feeding (Glanz et al., 2008). Therefore, I applied the first and second constructs of the PAPM to understand mothers' knowledge about complementary infant feeding. The third and fifth constructs of the PAPM were applied to understand if mothers have ever intended or decided to engage in practicing complementary infant feeding (Glanz et al., 2008). Therefore, I applied the third and fifth constructs of the PAPM to understand mothers' attitudes about complementary infant feeding. The sixth construct of the PAPM was applied to understand mothers' practices of complementary infant feeding (Glanz et al., 2008). Therefore, I applied the sixth constructs of the PAPM to understand mothers' practices of complementary infant feeding in this research study. The seventh construct of the PAPM would be a good fit to use if other researchers intended to conduct similar studies to verify the comparability of results of this research study with the follow-up studies in future. The seventh constructs of the PAPM turned out to be a good fit for understanding mothers' practices of the continuation of complementary infant feeding on a regular basis (Glanz et al., 2008). Moreover, in my research study, the constructs of the PAPM were used to have seen the association between mothers' knowledge, attitudes, and practices of complementary infant feeding and malnutrition in children.

Applying the first and second constructs of the PAPM to determine mothers' knowledge about complementary infant feeding, I found that 54%, 95% CI (49 - 60) of mothers had knowledge of introducing complementary foods to children in compliance with the WHO's guideline. The results of this study also confirmed that 19%, 95% CI (15 - 24) of mothers had knowledge of food diversity, 37%, 95% CI (32 - 43) of mothers had knowledge of meal frequency. Moreover, the statistics showed that 51%, 95% CI, (45 - 57) of mothers had knowledge of safe preparation of complementary foods in compliance with the WHO's guideline.

Finally, the results of this study demonstrated that 15%, 95% CI (11 - 19) of mothers had knowledge of vitamins and mineral supplements, 78%, 95% CI (73 - 83) of mothers had knowledge of feeding during and after illnesses, and 13%, 95% CI (10 - 17) of mothers had knowledge of responsive feeding in compliance with the WHO's guideline in Afghanistan.

Applying the third and fifth constructs of the PAPM to determine mothers' attitudes about complementary infant feeding, I found that 78%, 95% CI (74 - 83) of mothers expressed positive attitudes about introducing complementary foods at the right time to children. The results of this study confirmed that 59%, 95% CI (53 - 64) of mothers expressed positive attitudes about food diversity, and 45%, 95% CI (39 - 51) of mothers expressed positive attitudes about meal frequency. The results of the univariate analysis showed that 78%, 95% CI (73 - 82) of mothers expressed positive attitudes about safe preparation of complementary foods in compliance with the WHO's guideline. Moreover, the results of this study indicated that 27%, 95% CI (21 - 31) of mothers expressed positive attitudes about consuming vitamins and mineral supplements by their children, 81%, 95% CI (77 - 85) of mothers expressed positive attitudes about feeding during and after illnesses, and 34%, 95% CI (29 - 39) of mothers expressed positive attitudes about responsive feeding in compliance with the WHO's guideline in Afghanistan.

Using the PAPM to analyze to determine mothers' practices of complementary infant feeding, I found that 46%, 95% CI (41 - 52) of mothers introduced complementary foods to children in compliance with the WHO's guideline. The results of this research study showed that 10%, 95% CI (6 - 13) of mothers fed their children nutritionally diverse foods, 28%, 95% CI (23 - 33) of mothers practiced meal frequency in compliance with the WHO's guideline. The research also found that 15%, 95% CI (11 - 19) of mothers practiced safe preparation of complementary foods in compliance with the WHO's guideline. Finally, the results of this study confirmed that 14%, 95% CI (10 - 18) of mothers practiced consuming vitamins and mineral supplements by their children, 75%, 95% CI (70 - 79) of practiced appropriate feeding patterns during and after illnesses, and 11%, 95% CI (8 - 15) of mothers practices responsive feeding in compliance with the WHO's guideline in Afghanistan.

Comparing the results of this cross-sectional study with other studies, the findings of this research study were comparable with that of studies conducted in developing countries. I found that 46%, 95% CI (41 - 52) of mothers introduced complementary foods to children at the age of 6 months which was comparable with that of Uganda (53%) from the report of the cross-sectional research study (Isingoma et al., 2016). In Turkey, the researchers found that 55% of mothers introduced complementary foods to children at the age of 6 months (Koksal et al., 2015). The researchers found that 33% of mothers introduced complementary foods to their children at the age of 6 months in Solomon Island (UNICEF, 2014).

I found that 28%, 95% CI, (23 - 33) of mothers practiced meal frequency in compliance with the WHO's guideline which was comparable with that of 29% of mothers practiced meal frequency in compliance with the WHO's guideline in Uganda (Isingoma et al., 2016). In Ghana, the researchers found that 46%, 95% CI (42.3 - 49.9) of mother's practiced meal frequency in compliance with the WHO's guideline (Issaka et al., 2014).

I found that 10%, 95% CI (6 - 13) of mothers fed their children nutritionally diverse foods in compliance with the WHO's guideline. Comparing the results of my research study with results of the research study conducted in Ghana, about 30%, 95% CI (26.1 - 34.1) of children were fed nutritionally diverse foods in compliance with the WHO's guideline (Issaka et al., 2014).

Comparing the results of this research with the research studies conducted in Ghana, the findings indicated that mothers' practices of food diversity were low in Afghanistan as compared to mothers' practices of food diversity in Ghana. The driving factors could be associated with the lower literacy of mothers in Afghanistan. I found that 15%, 95% CI (11- 19) of mothers participated in this research study were literate which was comparable with that of 17% of mothers reported by UNESCO in Afghanistan (UNESCO, 2017). According to a study conducted in Ethiopia, 19% of children met the minimum dietary diversity in compliance with the WHO's guideline which was comparable with that of findings in my research study (Kassa et al., 2016). According to UNICEF survey report, 19% of children met minimum dietary diversity standard in compliance with the WHO's guideline in Solomon Island which is comparable with that of finding in this research study (UNICEF, 2014).

The results of a cross-sectional research study conducted in India concluded that 17% of mothers practiced safe preparation of complementary foods which was comparable with that of 15%, 95% CI (11 - 19) confirmed in this research study (Saleh, Ara, Hoque, and Alam, 2014).

I found that 75%, 95% CI (70 - 79) of mothers practiced feeding pattern during and after illnesses in compliance with the WHO's guideline in Afghanistan. According to a cross-sectional research study in Lima, 60% of mothers fed their children vegetables and fruit during the episodes of diarrhea which was comparable with findings demonstrated in my research study (Pantenburg et al., 2014). I found that 15%, 95% CI (11- 19) of mothers participated in this cross-sectional research studies were literate. On average, every family lived on $162, 95% CI (150 - 175). The findings of this research study are comparable with that of other studies conducted in developing countries.

Summarizing the findings, mothers' knowledge, attitudes, and practices of complementary feeding were statistically significant predictors of stunting and underweight in children. Moreover, mothers' attitudes about complementary feeding were statistically significant predictors of wasting. Specifically, mothers' knowledge, attitudes, and practices of introducing complementary foods to children, meal frequency, food diversity and responsive feeding were statistically significant predictors of stunting, and underweight in children. Whereas, mothers' knowledge and practices of complementary feeding were not statistically significant predictors of wasting in children in Afghanistan.

The most important insight that would add to the body of knowledge in the field of research is the practice of the theory of health education as the underpinning framework to craft and operationalize this research studies. There has always been a dichotomy of reluctance by the public health professionals and researchers to apply theories into practice. This study exemplifies the fact that applying a theory in a research study not only guides the researchers to craft quality research study but also to produce a body of knowledge for practice. Research studies should also aim to influence a positive social change.

Researchers need to get through the dichotomy of control that if desirable public health interventions and outcomes are expected, they can only be seen with the practice of theories of behavior change in the field of research. The other insight that would add to the body of knowledge is the practice of designing health promotion interventions based on health education and behavior change theories. Moreover, this research study would fill the literature gaps in Afghanistan and developing countries. This research study would also produce a wealth of knowledge and evidence about complementary infant feeding practices in Afghanistan. Such wealth of knowledge would assist public health professionals in making evidence-based practices in the field of public health. Finally, the results of this research study would extend the knowledge of employees of the Afghan Ministry of Health about public nutrition programs especially principles of appropriate complementary infant feeding.

Limitations of the Study

Cross-sectional studies are perceived the most predominantly applied research designs in the field social science. This study was designed to assess the association between mother's knowledge, attitudes, and practices of complementary infant feeding and malnutrition in children in Afghanistan. Some limitations of this study include 1: difficulty in determining causal association between explanatory and outcomes variables. The purpose of this cross-sectional research study was not to explore the paradigms of causal associations but to determine if maternal KAP was associated with malnutrition in children in Afghanistan (Barratt and Kirwan, 2009). 2: The cross-sectional studies could be implied to nonsuitability for exploring the rare phenomenon. Exploring the association between maternal KAP about complementary infant feeding and malnutrition cannot be seen as a rare phenomenon. UNICEF reported that over 50% of children are suffering from stunting and 1 in every 5 children are suffering from wasting in Afghanistan indicating that malnutrition is not a rare phenomenon (UNICEF & CSO, 2012).

3: The volatile security situation in Afghanistan is considered a limitation to conduct research studies. To overcome this problem, this study was conducted in Kabul Province, the Capital of Afghanistan, which is relatively secured. 4: Due cultural concerns, this study was conducted in hospital settings in Kabul Province. It was possible that some mothers from hard to reach areas face difficulties to come to public hospitals in Kabul province. To overcome this problem, a cluster random sampling strategy was applied to select 6 public hospitals across the province followed by applying a systematic random sampling approach to select a representative sample from women accompanied by their children aged 6-24 months in public 6 hospitals. Applying a cluster random sampling techniques to select public hospitals followed by a systematic random sampling to select the study participants resulted to have a representative sample in this study (Stat Trek, 2016). Appropriate quality control measures were established to prevent limitations that may affect validity and reliability of the data during the operationalization and analysis of the results.

Recommendations

More research studies are needed to conduct in Afghanistan to explore the patterns of complementary infant feeding practices in Afghanistan. Currently, there are huge literature gaps to fill in the field of health and nutrition in Afghanistan. However, this cross-sectional study is the first research study aiming to determine complementary infant feeding practices in Afghanistan. Given volatile security, the scope of this research study was geographically confined to Kabul province in Afghanistan. With improving the security situation, further research studies are needed to conduct at the national level in Afghanistan. Moreover, it is important to focus on promoting the use of theories and models of health education and behavior change in research studies in Afghanistan and other developing countries. Applying theories and models in research studies would validate the findings of the research studies and further guide the process of informed decision making. In future, more analytical cross-sectional studies integrated with theories and models of behavior change are needed to be conducted in Afghanistan and other developing countries. As a researcher, I need to play an effective role in engaging the employees of the Afghan Ministry of Health to utilize the finding of this research study for making informed policy and program decisions. My role can also be seen as a facilitator and advocate to conduct follow-up meetings with the policy and program staff of the Afghan Ministry of Health, UN sister agencies, civil society organizations, and other nongovernmental organizations to address the importance of the principles of complementary infant feeding in Afghanistan.

Moreover, my role can be seen as a mentor and coach to provide technical assistance to the employees of Afghan Ministry of Health in the process of developing public nutrition and nutrition education and behavior change interventions. Finally, my role can be seen as an advocate and facilitator to assist the policy and program staff of the Afghan Ministry of Health in materializing the actions recommended in this cross-sectional study. To better guide the process of informed policy and program decisions, the recommendations are organized in the following action areas:

At the Policy Level

Political commitment is essential to improving the nutritional status of children and fight against the irreversible and long-lasting negative effects of acute and chronic malnutrition in Afghanistan. Political commitment can be seen as committing accountability and moral support by the government to the cause of malnutrition in Afghanistan. Moreover, providing financial support can be seen as a driving factor to reduce malnutrition in children in Afghanistan. The results of this research study confirmed that family's income was a mitigating factor to reducing malnutrition in children. The government needs to invest as many as $50 on a monthly basis in families to improve the nutritional status of the malnourished child. Such investment would be more impactful in the long run in Afghanistan. It would impact morbidity and mortality among children and reduce the burden of patients on the health care system in Afghanistan.

Improving mothers' education would also be a valuable investment in Afghanistan. The Afghan Ministry of Health needs to address this issue at the policy level and closely work with the Ministry of Education to come up with practical strategies to enhance the level of education of girls and women in Afghanistan. Such investment would also turn out to reduce school dropout rate among children and increasing economic productivity at the national level in Afghanistan. The Afghan Ministry of Health also needs to work along with its partners, especially the European Delegation, USAID, World Bank and UN sister agencies to invest in developing and implementing effective nutrition policies and strategies. Malnutrition needs to be dealt with as a cross-cutting public health problem. The Afghan Ministry of Public Health needs to deal with the problem of malnutrition as a cross-cutting agenda and bring all stakeholders together in a common platform to address this public health problem in Afghanistan.

The finding of this study confirmed that the social determinants of health play an important role in aggravating or mitigating malnutrition. Therefore, the social determinants of health need to be addressed as a policy agenda.

The findings of this study can be used to assist the policy makers in reviewing and revising nutrition policies and strategies. This process needs to be led by the employees of Afghan Ministry of Health. My role can be seen as a facilitator in the process of reviewing and revising nutrition policies and strategies, especially in the process of reviewing and revising the Infant and Young Child Feeding Policy and Strategy in Afghanistan.

More advocacy is needed for promoting appropriate complementary infant feeding practices at the policy level in Afghanistan. At the policy level, it is essential to conduct the costing exercise of the national nutrition policy. In the next step, the Afghan Ministry of Health needs to commit cost of the operationalization of the national public nutrition policy.

Finally, to address the cause of malnutrition in Afghanistan, it is essential to establish health and nutrition advocacy group at the policy level to voice for the cause of malnutrition in Afghanistan and at the international forums.

At the Program Level

Reforming and restructuring of the nutrition programs are crucial because enhancing the capacity of public nutrition staff and infrastructures at the central and provincial level would result in a paradigm shift. Reforming and restructuring would also result in providing quality nutrition services to mothers and children in Afghanistan. At present, the public nutrition program did not compartmentalize public nutrition experts and dieticians within its official structure. In future, it would be required to invest in advancing the capacity of employees working in the public nutrition program in Afghanistan.

I recommended that constructive reforming and restructuring of the public nutrition program could be seen as a strategic intervention. The results demonstrated that 1 out of 2 children aged 5 years is malnourished in Afghanistan. The current structure cannot fully respond to the present and anticipated challenges and threats posed by malnutrition in Afghanistan. The current structure of public nutrition department needs to be upgraded within the official organogram of the Afghan Ministry of Health to the level of Directorate of Public Nutrition.

Strengthening research and informed decision-making processes are crucial to addressing the current challenges in the field health and nutrition in Afghanistan. Establishing a minimal capacity to plan, design and conduct research studies within the programmatic paradigm of nutrition is worth investing in Afghanistan.

Public Nutrition Department employees need to receive training on the WHO's guiding principles for complementary feeding of the breastfed child. Moreover, the WHO's guiding principles for complementary feeding of the breastfed child operationalization can be seen as a strategic investment in Afghanistan. Public Nutrition Department needs to request the WHO's Eastern Mediterranian Regional Office and other donors to provide technical and financial assistance to the Afghan Ministry of Health.

Nutrition education and awareness raising interventions can be seen as driving factors to reduce malnutrition in children. Public Nutrition Program needs to develop nutrition education and awareness raising materials in compliance with the WHO's guiding principles for complementary feeding of the breastfed child in Afghanistan.

Public Nutrition Program needs to organize food demonstration and cooking sessions in public health facilities. Such training and demonstration sessions would help mothers learn how to prepare nutritionally diverse foods from locally grown-up vegetables and foods.

It is recommended that nutrition program needs to focus on educating mothers about the principles of complementary infant feeding especially the principles of introducing complementary foods at the right time, meal frequency, dietary diversity, safe preparation of complementary foods, and responsive feedings in compliance with the

WHO's guiding principles for complementary feeding of the breastfed child in Afghanistan.

At the Community and Household Levels

Malnutrition turns out to be the outcome of the interplay of political, social, cultural and economic factors. Therefore, malnutrition needs to be dealt with as a cross-cutting agenda bringing all stakeholders from all across the country working together. To reduce malnutrition and its long-lasting negative effects, the most important intervention can be seen to enhance nutrition awareness among mothers at the family and community levels in Afghanistan. Nutrition awareness can be planned and conducted as countrywide nutrition education and awareness raising campaigns by involving community health workers, religious leaders, and community health shuras (councils). Nutrition education interventions can also be enhanced by displaying nutrition education messages through local radio stations and television stations. Nutrition awareness of mothers can also be conducted in as many as 2000 community-based health centers operating in Afghanistan by health workers and nutrition counselors. Utilizing as many as 25000 male and female community health workers and volunteers to enhance nutrition awareness among mothers could be seen as the most impactful public health interventions.

It is recommended to train community health workers on the WHO's guiding principles for complementary feeding of the breastfed child. Adopting a two-stage strategic approach focusing on equipping community health workers with the essential skills and knowledge of nutrition education on the first hand, and using community health workers to enhancing nutrition awareness of mothers, on the other hand, would prove an impactful public health intervention to reduce malnutrition among children in Afghanistan.

It is recommended that nutrition education interventions need to focus on enhancing mothers' awareness about complementary infant feeding, with emphasis on importance of introducing complementary foods at the age of 6 months to every child, meal frequency (2 to 3 meals at the age of 6 to 8 months, 3 to 4 meals at the age of 9 to 11 months, and 4 meals plus 1 or 2 snacks in addition to breast milk at the age 12 to 24 months), the principles of food diversity (grains, vegetables, fruits, meats, dairy products, nuts, oil, animal fat, chocolate, and sweet foods), and principles of responsive feeding (the mother keeps eye contact and talks to her child while feeding him/her, the mother encourages her child to eat by offering a reward, , the mother gives her child a dessert when she eats his/her food, the mother offers another food when her child refuses to eat his/her food or other strategies that persuade a child to eat her/his meal) at the community and household levels in Afghanistan.

Educating girls and women would turn out to have long-lasting impacts on health and nutrition of children in Afghanistan. Educating a woman can be seen as impactful as educating the entire family. The results of this study confirmed that mothers' literacy was amongst the driving factors that affected malnutrition in children in Afghanistan. Therefore, the results of this study need to be shared with the Ministry of Education to get them on board that educating mothers and girls can prove as one of most impactful investment to reducing malnutrition in children in Afghanistan.

Mothers need to receive training on practical feeding methods such as the concepts of kitchen and home grow gardening in Afghanistan. Learning such skills by mothers would turn out to have a positive impact on the nutritional status children and that of the entire family.

Implications for Postive Social Change

The findings of this research study demonstrated that 1 out of 2 children (51%) is malnourished in Afghanistan. This highlighted the fact that Afghanistan inherited a stunted, wasted, and underweight generation of children whose physical, mental, intellectual, and behavioral health and abilities are hindered. Such calamity turned out to have increased the risks of morbidity and mortality among children, potentiated the avoidable load of patients within the healthcare systems. It also skewed the utilization of resources that could have been channeled onto more impactful public health interventions and diminished the paradigm of productivity at the national level. Highlighting such wide spectrums of adverse consequences of malnutrition, it would be crucial to voice the problem of malnutrition as a priority public health agenda at the policy and program levels in Afghanistan.

The problem of malnutrition is exacerbated by the chronic nature of deficiency of reliable data and literature gaps in Afghanistan because lack of reliable data and gaps in literature affected the process of informed decision making within the health sector in Afghanistan. One of the most important implications of findings of this research study would be to guide the process of informed decision making at the policy and program action areas in Afghanistan. This, in turn, would influence a positive social change through promoting the physical, mental, and intellectual health of children and reduce morbidity and mortality associated with malnutrition in children in Afghanistan.

The findings of this research study can be used for advocating, mediating and to enabling purposes to impact a positive social change in the policy, organization, family and individual action areas. Influencing positive social change at the policy level can be guided by advocating the agenda of malnutrition as a priority public health problem in Afghanistan. The findings of this research study would be used to guide policy discussions for supporting the process of reviewing and revising public nutrition policies and strategies in Afghanistan. The process of revision of nutrition policy and strategies would not just be led by the policy level staff of the Afghan Ministry of Health, but other government and organizations and stakeholders as well.

Advocating for the cause of malnutrition through guiding policy discussions and strengthening the process of evidence-based decision making would result in enhancing political commitment and policy support in Afghanistan. A positive social change can be influenced as a result of building healthy nutrition policies that can be led to reducing malnutrition among children in Afghanistan in future.

Policy commitment and support can impact a positive social change at the organization, family, and individual levels in Afghanistan. Under the recommendation section, I recommended that enhancing the capacity of public nutrition program employees, establishing research capacity at the program level to plan, design, and implement research studies independently in future. Moreover, the operationalization of the WHO's guiding principles for complementary feeding of the breastfed child could impact a positive paradigm shift at the organizational level.

Such positive paradigm shift would impact a positive social change at the organizational level in Afghanistan. The findings of this research study can also be used by the employees working in private sector to make informed decisions for improving the health and nutrition status of children in Afghanistan. Moreover, public nutrition program employees can be equipped with the essential skills and knowledge on complementary infant feeding in compliance with the WHO's guiding principles for complementary foods of the breastfed child. The employees of public nutrition program can utilize their knowledge and skills about complementary infant feeding to impact a positive social change within Afghan communities and families. Public nutrition program employees need to transfer their knowledge and skills about complementary infant feeding to health workers in the private sector. The public and private sectors can work along to educate communities and families about the principles of complementary infant feeding. Thus, public and private organizations can work together to impact a positive social change by reducing malnutrition rates in children in Afghanistan. My role can be seen as a mentor and facilitator in this process to bridge between public nutrition program, the private sector, UN agencies especially World Health Organization in Afghanistan to bring them closer for influencing a positive social change by reducing malnutrition in children.

A positive social changed can be seen at the family and individual levels by educating mothers about the importance of principles of the complementary infant feeding in compliance with the WHO's guideline. Empowering mothers by enhancing their health and nutrition literacy levels can impact a positive social change in Afghanistan. This research study demonstrated that mothers' poor knowledge, attitudes, and practices of complementary infant feeding were associated with malnutrition in children. The positive social change from this cross-sectional research study would be improving nutrition outcomes by promoting mothers' knowledge and practices of the principles of the complementary infant feeding in compliance with the WHO's guideline. It is crucial to promoting mothers' practices of introducing complementary foods at the right time, dietary diversity, meal frequency, and responsive feeding in Afghanistan. Thus a positive social change could be seen by educating policy staff, public nutrition program employees, communities, and mothers on the importance of promoting complementary infant feeding in compliance with the WHO's guiding principles for complementary feeding of the breastfed child in Afghanistan.

Recognizing the importance of theories of health education and behavior change helps the policy and program staff of the Afghan Ministry of Health to better understand the problem of malnutrition and its negative consequences by linking their constructs and variables. It also helps them design and operationalize health and nutrition education interventions to promote appropriate complementary infant feeding practices in Afghanistan. Incorporating the application of theories of health education and behavior change in public nutrition practices would impact a positive social change. The validity of research studies can be taken for granted by incorporating theories into research practices. This would help public health professional understand the research problems in a systematic way by linking problem statements with research questions and variables.

Thus, I strongly recommend the application of theories into research practices in future in Afghanistan.

Conclusions

My research study confirmed that the prevalence rate of malnutrition is alarmingly high in children in Afghanistan. 1 out of every 2 children (51%) aged between 6 to 24 months is stunted, one out of every three children (29%) is underweight, and 1 out of every 6 children (14%) is wasted in Afghanistan. Literature review demonstrated that Afghanistan inherited a stunted cohort of children that could its irreversible effects be impacting the physical, mental and social well-being of Afghan communities.

My research study demonstrated that mothers' knowledge and practices of complementary infant feeding were insufficient to make healthy choices. As many as 1 in 2 mothers 54%, 95% CI (49 -60) had knowledge of introducing complementary foods at the right time to their children in Afghanistan. I found that 1 in 5 mothers 19%, 95% CI (15 - 24) had knowledge of dietary diversity, less than 1 in 3 mothers 37%, 95% CI (32 - 43) had knowledge of meal frequency, 1 in 2 mothers 51%, 95% CI (45 - 57) had knowledge of safe preparation of complementary foods, 1 in 6 mothers 15%, 95% CI (11 - 19) had knowledge of vitamins and mineral supplements, as many as 78%, 95% CI (73 - 83) of mothers had knowledge of feeding during and after illnesses, and 1 in 8 mothers 13%, 95% CI (10 - 17) had knowledge of responsive feeding in compliance with the WHO's guideline in Afghanistan.

I also found that 46%, 95% CI (41 - 52) introduced complementary foods at the right time to their children. One in 10 mothers 10%, 95% CI (6 - 13) fed their children nutritionally diverse foods. One in 3 of mothers 28%, 95% CI (23 - 33) practiced meal frequency. One in 6 mothers 15%, 95% CI (11 - 19) practices safe preparation of complementary foods. One in 7 of mothers 14%, 95% CI (10 - 18) of mothers practiced consuming vitamins and mineral supplements by their children and 1 in 9 mothers 11%, 95% CI (8 - 15) practiced responsive feeding and, 75%, 95% CI (70 - 79) of mothers practiced appropriate feeding patterns during and after illnesses, and in compliance with the WHO's guideline in Afghanistan.

Moreover, this research study demonstrated that mothers' knowledge, attitudes, and practices of complementary feeding were statistically significant predictors of stunting and underweight in children. Mothers' attitudes about complementary feeding were statistically significant predictors of wasting. Specifically, mothers' knowledge, attitudes, and practices of introducing complementary foods, meal frequency, food diversity, and responsive feeding in compliance with the WHO's guideline were statistically significant predictors of stunting, and underweight in children. On the contrary, mothers' knowledge and practices of complementary feeding were not statistically significant predictors of wasting in children.

Concluding the fact that not coping with the problem of malnutrition is catastrophic in Afghanistan, to effectively cope with the problem of malnutrition in Afghanistan, the Afghan Ministry of Health needs to focus on the four actions areas as follows: 1) revising nutrition policies to adequately address the problem of malnutrition, 2) reorienting public health and nutrition interventions responsive to the compelling needs of communities, 3) enhancing health workers skills in the areas of service delivery, monitoring and research, and 4) mobilizing community actions, strengthening community networks, and creating supportive environment for mothers that could make healthy choices.

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