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### RESEARCH ARTICLE

#### COMPLEMENTARY FEEDING PRACTICES IN AFGHANISTAN

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#### Abstract

**Background:** Children in Afghanistan are at greater risk of malnutrition. Over 50% of children were suffering from malnutrition in Afghanistan in 2012, which has a long-lasting physical, mental, social, and impact on children.

**Study purpose:** The purpose of this research study was to explore the association between parents' knowledge, attitudes, and practices about complementary feeding and stunting in children in Afghanistan. The predictor variables were mothers' knowledge, attitudes, and practices about complementary feeding and the outcome variable was stunting status of children aged 6 to 24 months.

**Research methods:** A quantitative cross-sectional survey was conducted with randomly selected participants who were living in Kabul, Afghanistan. Logistic regression models were used to analyse the data.

**Research setting:** This research was conducted in 6 hospitals in Kabul, Afghanistan.

**Study participants:** The study participants included 306 mothers who had children aged between 6-24 months.

**Results:** Mothers' knowledge, attitudes, and practices were significant predictors of stunting in children,  $\chi^2 (9, N = 306) = 45.33, p < .001$ ;  $\chi^2 (9, N = 306) = 26.71, p < .01$ ; and  $\chi^2 (9, N = 306) = 56.97, p < .001$ . Mothers who did not practice responsive feeding were 7.1 times more likely to have stunted children than mothers who practiced responsive feeding.

**Social and policy implications:** The social and policy implications of this research study include reviewing nutrition policies, investing in nutrition programs, and increasing public education and awareness in promoting appropriate complementary infant feeding practices in Afghanistan.

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#### Introduction:-

Appropriate complementary feeding contributes to reducing the risk of malnutrition in children (World Health Organization, [WHO], 2005). The term appropriate complementary feeding is defined as "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 [PAHO]; WHO [2001, pp. 8-9). WHO and

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PAHO (2001), also recommended providing infants and children nutritionally diverse foods at the age of 6 -24 months. Furthermore, safe preparation of complementary foods, administration of essential vitamins and minerals, and practicing responsive feeding account for reducing the risks of malnutrition in children (PAHO & WHO, 2002). Practicing inappropriate complementary feeding can expose infants and children to a greater risk of malnutrition and illness (WHO, 2016). About 50% of children were experiencing malnutrition in 2012 in Afghanistan (United Nations International Children's Emergency Fund & Central Statistics Organization, 2012). The literature review suggested that numerous studies explored the impact of exclusive breastfeeding among infants and children; however, there is a gap in the literature related to the association between complementary feeding practices and malnutrition in children. This research study was the first quantitative research study exploring the association between parents' knowledge, attitudes, and practices about complementary feeding and malnutrition in children in Afghanistan. The researcher used WHO's guiding principles for complementary feeding for the breastfed child (WHO, 2001).

**Problem:**

Good nutrition is crucial for good health. Malnutrition increases the risk of morbidity and mortality among infants and children. Addressing the problem of malnutrition is considered one of the salient public health problems, particularly in the poor and resource-constrained countries worldwide. Malnutrition is adversely affecting the health and wellbeing of millions of children in the globe (Bread for the World Organization, 2020). Reports suggest that approximately 55 million children suffer from malnutrition where 19 million children are inflicted by the most serious types of malnutrition namely severe acute malnutrition (Action Against Hunger, 2020). Annually, over 3.1 million children die of malnutrition and hunger-related causes that account for over 40% of all children's death across the globe (Action Against Hunger, 2020).

Malnutrition can manifest in the following ways:

1. **Stunting:** Is a term applied to explain an infant and/or a child who is short for her/his age. Poor nutrition, in the earliest stages of life, can result in irreversible physical, mental and cognitive-developmental damage in children (Children International, 2020).
2. **Wasting:** Is the term applied to explain an infant and/or a child who is too thin for his/her height (Children International, 2020).
3. **Underweight:** Is the term applied to describe an infant and/or a child who is too thin for his age (World Health Organization, 2010).
4. **Overweight:** Is a term applied to describe an infant and/or a child whose weight is more than it ought to be for his/her height (Children International, 2020).

Without understanding malnutrition, one cannot understand the amount of energy and nutrients an infant or child needs to obtain optimal health. Malnutrition, beyond inhibiting children's physical health and wellbeing, also prevents the brain from growing, which in turn leads to challenges in cognitive growth and learning. Furthermore, it puts children at greater risks of disease and other adverse health consequences (Children International, 2020).

**Literature Review:-**

Gaps in the literature exist in the understanding of the role of complementary feeding practices at the household level in Afghanistan. Adequate nutrition is essential for the physical and cognitive development of infants and children. The fact is well understood that from birth to 2 years of age is considered a critical window for the physical and cognitive development and growth of children, (WHO & PAHO, 2001). Nutrition deficiency and childhood illness are contributors to stunting in children (WHO & PAHO, 2001). Furthermore, inappropriate complementary feeding practices coupled with poor access to maternal and child health services are contributing to stunting in children (United Nations Children's Fund & Central Statistics Organization [UNICEF], 2012). About 8% of children below the age of 5 years are at risk of dying in Afghanistan, 50% of children experienced chronic malnutrition, 18% of children experienced acute malnutrition, and 31% of children experienced underweight (UNICEF & CSO, 2012). According to WHO (2001), complementary feeding practices are likely to play an effective role in reducing infant and child mortality in Afghanistan. Numerous reviews suggested that stunting increases the risk of mortality in children (Myatt et al., 2018). Every year, over two million deaths can be attributed to stunting in developing countries. Moreover, stunted children are also at higher risk of wasting and being underweight (Myatt et al., 2018).

The term malnutrition is defined as “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” (UNICEF, 2016, para. 1). According to WHO (2016), complementary feeding is an intervention that is used when exclusive breastfeeding is not enough to fulfill the nutritional needs of an infant and as he/she is transitioning from exclusive breastfeeding to family foods. It is highly recommended that mothers need to initiate complementary foods to their infants while continuing breastfeeding. The continuation of breastfeeding supplemented with complementary foods can provide adequate calories and protein for the growth and development of infants and children (WHO, 2001).

The term knowledge is defined as “the set of facts, information, and ideas acquired by a person” (UNICEF, 2014, pp. 11-14). In this article, the term knowledge is referred to the level of information and awareness of mothers about complementary feeding practices in compliance with WHO’s guiding principles for complementary feeding of the breastfed child (WHO, 2001). The term attitude is defined as “ways of thinking or expressing desire about something or someone and is not always observable”(UNICEF, 2014, pp. 11-14). In this article, the term attitude is referred to as the level of desire expressed by mothers to practice complementary feeding. 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 article, the term practice refers to the 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 responsive feeding is defined as infants are being fed and/or encouraged rather than being forced to eat (WHO, 2001). The process of preparing and serving meals to young children safely and hygienically is defined as safe preparation and storage of complementary foods (WHO, 2001).

Mothers’ literacy and education are predictors of whether the WHO’s guiding principles of initiating complementary foods for infants are followed. Literate mothers were more likely to initiate 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). Research studies in poor and developing countries show that literate mothers tend to be more knowledgeable about the importance of complementary feeding practices and more likely to practice complementary feeding as compared to illiterate mothers (Issaka et al., 2015). In another research study, mothers’ education is found to be a predictor of whether they implemented WHO’s principles of complementary feeding practices for infants or not. Research shows that mothers who attended secondary and high schools were 3.2 times more likely to practice complementary infant feeding (AOR: 3.24; 95% CI: 1.28 - 8.20) in Ethiopia (Kassa et al., 2016)

Infants require more energy and nutrients at the age of 6 months when breast milk alone can not meet their energy and nutrient that fulfill their physical and cognitive growth. According to WHO, mothers need to initiate complementary foods at the age of 6 months to their infants while they should still continue breastfeeding until the age of 2 years. Knowledge of introducing complementary foods in mothers is a predictor of whether the WHO’s complementary feeding guidelines for infants are followed in Afghanistan. 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. Initiating complementary feeding at the right time will ensure that the essential energy and nutrient needs of their infants are met and will reduce the risk of stunting in children in Afghanistan (WHO, 2001).

According to Issaka et al. (2015), the number of antenatal visits and access to social media platforms were considered significant predictors of meal frequency as per WHO’s guidelines for complementary feeding in African countries. Mothers having access to radio programs were less likely not to follow the WHO’s guiding principles of meal frequency for infants (OR: 0.69% CI 0.57 – 0.82; P-value < 0.001). According to Issaka et al. (2014), as low as 46% (95% CI 42.3 - 49.9) of mothers who had children under 2 years of age were following the WHO’s guiding principles of meal frequency in Ghana. The results of this research study show that about 28% of mothers follow WHO’s guiding principles for meal frequency which is lower than the results found about the practice meal frequency in Africa. Increasing mothers’ awareness and education will increase mothers’ knowledge and practice about WHO’s guiding principles of meal frequency in Afghanistan.

With increasing infants’ age, mothers need to increase the frequency of complementary foods. At the age of 6-8 months, infants require semi-solid meals 2-3 times, at the age of 9 -12 months, infants require complementary foods 3- 4 times, with 1-2 times additional snacks that mothers should provide on a daily basis (WHO, 2001). Results

suggest that following the WHO's guiding principles for meal frequency is a predictor of stunting in children in Afghanistan. Mothers who did not practice meal frequency in compliance with the WHO's guidelines were 2.4 times more likely to have stunted children than the mothers who practiced meal frequency. According to WHO (2011), parents need to increase the frequency of complementary foods following WHO's guiding principles of complementary feeding to meet the energy and nutritional needs of their infants and children. Practicing meal frequency in compliance with the WHO's guidelines will prevent stunting in children in Afghanistan.

According to Issaka et al. (2014), mothers' awareness and practices about complementary feeding are low in Afghanistan and other low-income countries. Increasing mothers' education and health literacy is a significant predictor of complementary feeding practices in resource-constrained countries. Educated parents are 4 times more likely to practice complementary feeding as compared to illiterate parents (AOR: 3.55; 95 % CI 1.05 - 12.02). These results are similar to those found by Marriott, Campbell, Hirsch, and Wilson, (2007), in their cross-sectional household surveys that were conducted in 20 countries. The findings suggested that the majority of parents had minimal knowledge about the importance of complementary foods for their infants and children as well as semi-solid foods were not served to infants aged 6 months and over as per WHO's recommendations (Marriott et al., 2007). According to Isingoma et al. (2016), sociodemographic factors including mothers' literacy and age influenced complementary feeding practices in Uganda. According to Isingoma et al. (2016), parents' education was a significant predictor of introducing diverse complementary foods to their children. Educated parents continued to introduce 4 or more foods including meat, fruits, and dairies to their children (Isingoma et al., 2016). The evidence in the literature suggests that it is critical to ensure that mothers are provided with guidance about appropriate complementary feeding of their children aged 6 to 24 months (WHO & PAHO, 2001).

According to a survey in India, as low as 29% of mothers were aware of the right time of introducing complementary foods to their infants (Roy et al., 2009). The results found in India about mothers' awareness of initiating complementary foods at the right are different than those found in my study. According to this study, about 54 % of mothers had knowledge of the right time to introduce complementary foods. Action Against Hunger International (2007), found that over 55% of mothers began to introduce complementary foods to their infants at the age of 6 months because they did not have sufficient breastmilk and delaying the initiation of complementary foods was a significant predictor of malnutrition in infants. According to UNICEF (2014), about 50% of parents initiated complementary foods to their infants at the age of 6 months. The results found by Action Against Hunger International (2007), and UNICEF (2014), are similar to those I found in this research study. The results in the literature suggest that it is important to increase mothers' awareness regarding initiating complementary feeding at the right time. Initiating complementary foods at the right time will contribute to the physical and mental development of infants and children in Afghanistan.

According to a study conducted by UNICEF, diverse food is a strong predictor of growth in children (UNICEF, 2014). The results in this research study show that 19% of mothers have knowledge of providing diverse foods to their infants and 10% of mothers provided diverse foods in accordance with WHO's guiding principles for complementary feeding of the breastfed child in Afghanistan. Moreover, mothers' knowledge about food diversity found a predictor of WHO's complementary feeding. 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 in compliance with WHO's guidelines. Increasing mothers' knowledge about complementary feeding will contribute to reducing stunting in children in Afghanistan.

Understanding the principles of responsive feeding helps mothers create a friendly environment to recognize infants' cues and help them receive proper feeding. Knowledge and practice of responsive feeding help mothers feed their infants slowly and encourage their infants to eat but not to force them (WHO, 2009). According to a cross-sectional study conducted in Afghanistan, about 40% of mothers were following WHO's guiding principles of responsive feeding. They got engaged in talking to their children while providing complementary foods (UNICEF, 2014). Results in this research study show that 13% of mothers have knowledge about responsive feeding and 11% practice responsive feeding in compliance with WHO's guiding principles for complementary feeding of the breastfed child. Responsive feeding is a predictor of stunting in children. Mothers who did not practice responsive feeding in compliance with 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 WHO's guiding principles of the breastfed child. Research shows that in poor countries including Afghanistan, mothers tend to have less knowledge about the principles of responsive feeding practices and less likely to implement responsive feeding practices in

compliance with WHO's guidelines. Safe preparation, serving, and storing complementary foods are important elements of WHO's guiding principles of complementary feeding for infant feeding. According to WHO's guidelines of complementary feeding practices, hand washing is critical prior to preparation and serving complementary foods to infants (WHO, 2009). According to a study conducted in Bangladesh, as low as 17% of mothers were engaged in handwashing practices before food preparation and serving. These results are similar to those found in this research study. In Afghanistan, 15% of mothers practiced safe preparation of complementary foods in compliance with the WHO's guidelines. In another study, mothers' education and health literacy, social and cultural norms, safe preparation, and storage of meals were some of the driving factors in promoting complementary feeding practices as per WHO's guiding principles for complementary feedings of the breastfed children (Saleh, Ara, Hoque&Alam, 2014). In poor countries including Afghanistan, mothers tend to have less knowledge about the safe preparation of complementary foods as well as less likely to implement safe preparation of complementary food in compliance with WHO's guiding principles of complementary feeding practices.

Providing sufficient complementary foods and fluid during and after childhood illnesses is critical for the physical growth and wellbeing of children. After recovering from illnesses, an infant is in need of greater energy and nutrient to compensate for the energy and nutrient losses. It will allow for regaining weight loss and their body nutritional needs (WHO, 2001). Research shows that infectious diseases including malaria, respiratory system infections, and diarrhea were identified as driving risk factors for stunting in children in developing countries (Isingoma et al., 2016). Diarrhea accounted for about 40% reduction in continuing complementary foods for infants (Isingoma et al., 2016). According to Pantenburg et al. (2014), over 70 % of mothers either discontinued or reduced the frequency and/or amounts of complementary foods while their infants were suffering from episodes of diarrhea in Lima. Over 20% of parents perceived continuing complementary foods is harmful to children during illness particularly diarrhea (Pantenburg et al., 2014). Results show that 1 in every 3 mothers does not follow WHO's guiding principles of complementary feeding during and after illnesses in Afghanistan. It is important to improve complementary feeding practices during and after illnesses given that providing complementary foods during and after illness will allow for maintaining energy and nutrition needs and will accelerate recovery from illnesses in children.

## **Research Design And Methods:-**

### **Research questions:**

Question 1: What is the 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?

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

The researcher applied a quantitative cross-sectional research survey design to explore the association between parents' knowledge, attitudes and practices about complementary feeding and malnutrition in children aged 6 – 24 months in Afghanistan. Through applying a cross-sectional observational research study, the association between multiple risk factors and outcomes were explored to help guide evidence-based informed decisions to improve the health and nutrition status of children in Afghanistan.

The study population included mothers who had children aged 6 – 24 months which accounts for about 6 percent of the total population in Afghanistan. The list of hospitals was obtained from the Afghan Ministry of Health and 6 hospitals were randomly selected in Kabul, Afghanistan. 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 randomly selected public hospitals. After creating the list of potential study participants, a systematic random sampling technique was applied to recruit each study participant. (Stat Trek, 2016). To recruit each study participant, 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 planned to have the survey administered to them. I assumed that on the first day, 50 women who had a child aged between 6 to 24 months would be listed. I divided the total number of listed participant (50 women) by the total number of women to whom I would administer the survey each day (10 women), to calculate a sampling interval. For instance,  $50/10=5$ . In total, 10 women were surveyed in person daily. To recruit the first study participant, 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 (Stat Trek, 2016). 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 (Stat Trek, 2016). Assuming that the first study participant who was randomly selected was listed as the second woman in the sampling list of 50 women, after recruiting the first study participant, every 5th woman was selected from the list to complete the in-person survey administration (Stat Trek, 2016). This exercise was repeated until the in-person survey administration for the entire sample of the study participants was completed. The G\* power analysis was used with an effect size of 0.8, and 0.50 and alpha level of 0.05 to determine the sample size. The computed sample size for statistical significance was 278 women who have a child aged between 6 to 24 months (Erdfelder et al., 1996).

To ensure the generalizability of the findings in this research study surveys were administered in person to 306 mothers who had children 6 – 24 to gather data on their knowledge, attitudes, and practices about complementary feeding. I used close-ended questions to gather information from my study participants. I also gathered anthropometric data for children aged 6 – 24 months. Informed consent was obtained from each study participant prior to administering the survey. Sociodemographic data, anthropometric measurements were gathered on height/length, and weight of children aged between 6-24 months. Information was collected on mothers' knowledge, attitudes, and practices of complementary feeding in accordance with WHO's guiding principles for complementary feeding of the breastfed child (WHO, 2008). To capture quality data, a quality control plan with a focus on ensuring the validity and reliability of data was developed and implemented throughout data gathering, analysis, and dissemination (Research Rundowns, 2009).

#### **Data analysis:**

The data management and analysis plan followed a roadmap grounded in managing research survey data, analyzing survey data, and disseminating the results to help guide evidence-informed decisions in Afghanistan (Centers for Disease Control, 2013). A Chi-Square test and logistic regression were conducted on this research survey data. The predictor variables were defined as parents' knowledge, attitudes, and practice about complementary feeding and the outcome variables were the nutritional status of children aged 6-24 months. The covariates were the level of education and economic status of parents. The research was conducted in a natural setting, therefore, the threats to testing reactivity were taken care of in this research study. Applying the principle of randomization, the threat to external validity was ruled out (Campbell & Stanley, 1963). The threats to internal validity were ruled out by defining and applying quality control measures at the stage of planning, data collection, data analysis, and dissemination of results (Trochim, 2006).

#### **Ethical procedures:**

This research study was conducted in compliance with the principles of informed consent, voluntary participation, no harm, beneficence, privacy, and confidentiality (American Psychological Association, 2016). The researchers obtained informed consent before embarking on conducting interviews with the study participants. The researchers complied with ethical procedures, norms, and principles defined by the IRB of Walden University (Walden University, 2015). The researchers obtained approval from the Institutional Review Board (IRB) from the Afghan Ministry of Public Health as well as Walden University.

#### **Results:-**

The purpose of this research study was to explore the association between parents' knowledge, awareness, and practices about complementary feeding and malnutrition in children. The researcher applied a univariate analysis, chi-square, and logistic regression analyses to prove the research hypotheses.

#### **Univariate analyses:**

The researcher applied a univariate analysis to generate descriptive statistics. Descriptive statistics and data provide information on participants' age, height, weight, socioeconomic status, as well as the level of knowledge, attitudes, and practices about complementary feeding in Afghanistan. In addition, data provide information on the classification of malnutrition given height-for-age on z scores, which can be seen in Table 1 to 5.

**Table 1:-** Results of univariate analysis showing sample size, family income, mothers' age, and children age, weight, height .

Variables	N	Minimum	Maximum	Mean	SD
Family size	306	2	19	6.2	2.2

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 2:-**Mothers' knowledge About Complementary Feeding.

Mothers have knowledge	Percentage	95% C.I.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 3:-**Mothers' Attitudes About Complementary Feeding.

Mothers express positive attitudes	Percentage	95% C.I.for 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 4:-**Mothers' Practices of Complementary Feeding.

Mothers practice	Percentage	95% C.I.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 5:-**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

**Multivariate analyses:**

Logistic regression analyses were applied to explore if parents' knowledge, attitudes, and practices were significant predictors of chronic malnutrition (stunting) among children aged 6-24 months in Afghanistan. The underlying assumptions of logistic regression models were tested and there was no violation in the assumption of no perfect collinearity, linearity, missing values and binary nature of outcome variables while exploring the association between mothers' knowledge, attitudes, and practices about complementary feeding and stunting in children (Field, 2012).

**Mothers' knowledge about complementary feeding and stunting:**

The results of multivariate analyses suggested that the logistic regression model containing all predictor variables was statistically significant,  $\chi^2$  (9, N = 306) = 45.33,  $p < .001$ . The logistic regression model explained between 13.8 (Cox and 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. 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 in compliance with WHO's guidelines. 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. 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 6 below.

**Table 6:-** Variables in the equation: stunting and mothers' knowledge about complementary infant feeding.

Variables	B	S.E.	Wald	Df	P	Exp(B)	95% C.I.for 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' attitudes about complementary infant feeding and stunting:**

The results of multivariate analyses suggested that the model including all predictor variables was statistically significant,  $\chi^2$  (9, N = 306) = 26.71,  $p < .01$ . The model explained between 8.4 (Cox & Snell R square) to 11.1 (Nagelkerke R squared) of the variance in stunting in children aged 6 to 24 months in Afghanistan and correctly classified 60% of the cases. Results suggested 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. Please see the description of the model in Table 7 below.

**Table 7:-** Variables in the equation: stunting and mothers' attitudes about complementary infant feeding.

Variables	B	S.E.	Wald	Df	P	Exp(B)	95% C.I.for 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' practices of complementary infant feeding and stunting:

The results of the multivariate analyses suggested that the logistic regression model including predictor variables was statistically significant,  $\chi^2$  (9, N = 306) = 56.97,  $p < .001$ . The logistic regression model as a whole explained between 17 (Cox and Snell R square) to 22.2 (Nagelkerke R squared) of the variance in stunting in children aged between 6 to 24 months in Afghanistan. The model correctly classified 66% of the cases. The results suggested that 4 predictor variables made a significant contribution to the model. The strongest predictor was mothers' practicing responsive feeding. Mothers who did not practice responsive feeding in compliance with 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 WHO's guiding principles of the breastfed child. The second predictor was mothers' practicing meal frequency. Mothers who did not practice meal frequency in compliance with WHO's guidelines 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, mothers who did not introduce complementary foods in compliance with WHO's guideline were 2.1 times more likely to have stunted children than mothers who introduced complementary foods in compliance with WHO's guidelines. Finally, the family income variable was a statistically significant predictor of malnutrition in children, where a one-unit (I USD) increase in family's income was associated with a child being 0.99 times less likely to be stunted. Please see the description of the model in Table 8 below.

**Table 8:-**Variables in the equation: stunting and mothers' practices about complementary infant feeding.

Variables	B	S.E.	Wald	Df	P	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Mothers' practices on introducing CF	.778	.254	9.358	1	.002	2.177	1.322	3.583
Mothers' practices on diverse foods	.813	.488	2.773	1	.096	2.255	.866	5.875
Mothers' practices on 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 on vit and minerals	-.110	.440	.062	1	.803	.896	.378	2.124
Mothers' practices on feeding during and after illnesses	.573	.306	3.519	1	.061	1.774	.975	3.229
Mothers' practices on 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		

### Discussion:-

A quantitative cross-sectional study was applied to explore if mothers' knowledge, attitudes, and practices about complementary feeding were significantly predictors of chronic malnutrition (stunting) in children aged 6-24 months in Afghanistan. The Precaution Adoption Process Model of behavior change was used to guide this research study. Totally, 306 mothers and their children aged between 6 to 24 months took part in this cross-sectional research study in 6 hospitals in Kabul, Afghanistan.

The findings suggested that 1 out of 2 children aged 6 – 24 months (51%) is stunted, with 1 in every 3 children (29%) is moderately stunted and 1 in 4 children (22%) is severely stunted in Afghanistan. The finding of this study is consistent with the findings of other studies in Afghanistan. UNICEF reported that about 55% of children were suffering from stunting in Afghanistan (UNICEF & CSO, 2012). Stunting can be a great threat to the physical and cognitive development of children in Afghanistan. Stunting can be even more devastating to the social and economic wellbeing of families in Afghanistan.

WHO's guiding principles for complementary feeding summarizes 7 key principles that include: 1) initiating complementary foods at the age of six months and gradually increasing the amount of complementary foods as infants and children are growing older while continuing breastfeeding; 2) increasing complementary foods in frequency as well as food in variety, at the age of 6 months, infants require complementary foods 2-3 times a day, at the age of 9 – 12 months, infants require complementary foods 3-4 times with adding nutritional snacks in their daily dietary intake; 3) Complementary food diversity, as infants are growing, they should consume nutritionally diverse foods including complementary foods from fish and animals, dairy products, pulses, fruits, and vegetables, oil and fat as per WHO's guiding principles of food consistency; 4) safe preparation and serving of complementary foods that emphasize on implementing good hygiene and handling of complementary foods during preparation and serving complementary foods, 5) use of mineral and vitamin supplements for infants and children given that infants and children require vitamin and mineral supplements for their physical and mental growth and wellbeing; 6) feeding patterns during and after illness, infants require more nutrients and fluid during and after illness to provide for their growth, nutritional loss and recovery; and 7) responsive feeding recommends implementing the principles of psychosocial care and bonding between infants and mothers (WHO, 2009).

Research shows that mothers' education and awareness are predictors of whether the WHO's complementary feeding practices for infants are followed in Afghanistan. Educated mothers tend to introduce complementary foods at the right time as compared to illiterate mothers (OR: 3.55; 95% CI 1.05 – 12.02; P-value < 0.05). This was true in Afghanistan as well as in other developing countries. Kassa et al. (2016), concluded that in Ghana, mothers who completed their high schools were more likely to have knowledge about the principles of complementary feeding (AOR: 3.24; 95% CI: 1.28 - 8.20). The Afghan Ministry of Health and partners need to invest in increasing mothers' awareness about complementary feeding using different health promotion strategies including social media, nutrition education campaigns and distributing nutrition education materials.

Research shows that in low-income countries including Afghanistan, mothers tend to be less knowledgeable regarding the importance of complementary feeding practices and less likely to implement them. I found that about 54% of mothers had knowledge about the right time of initiating complementary foods. In India, about 29 % of mothers were knowledgeable about the right time of introducing complementary foods (Issaka et al., 2014). About 37% of mothers were knowledgeable of meal frequency. and only 13% were aware of responsive feeding in compliance with WHO's guiding principles for complementary feeding. This highlights the fact that increasing mothers' knowledge and awareness about appropriate complementary feeding practices should be one of the important public health programs that the Afghan Ministry of Health needs to implement. The findings in this research study are comparable with other studies conducted in the 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 (Isingoma et al., 2016). The results of this study also suggested that the majority of mothers were likely to express positive attitudes toward practicing complementary feeding however, the level of practicing complementary feeding found to be very low among mothers in Afghanistan. The results suggested that about 10%

of mothers 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 vitamins and minerals by their children in Afghanistan. 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 (Isingoma et al., 2016). 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 a survey report, 19% of children met the minimum dietary diversity standards in compliance with the WHO's guidelines in Solomon Island which is comparable with that of finding in this research study (UNICEF, 2014).

Furthermore, the results of multivariate analyses suggested that mothers' knowledge, attitudes, and practices were significant predictors of stunting in children in Afghanistan. Moreover, mothers' education and family incomes were also found to be significant predictors of stunting in children in Afghanistan. The strongest predictors of mothers' attitudes about complementary feeding were meal frequency and family incomes. Mothers who expressed positive attitudes about complying with meal frequency as per WHO's recommendations were 1.8 times less likely to have stunted children. Moreover, family income is likely to play a significant role in reducing stunting in children in Afghanistan.

Mothers' awareness about complementary feeding as well as mothers practicing complementary feeding as per WHO's recommendation was playing a key role in reducing malnutrition in children in Afghanistan. This is comparable with the findings in other studies. The driving factors were 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). Results suggested that mothers' awareness about meal frequency, food diversity, and the right time to initiate complementary foods were playing an important role in reducing malnutrition in children. Mothers practicing complementary feeding found to play an important role in reducing chronic malnutrition (stunting) in children in Afghanistan. Mothers' practicing responsive feeding were 7 times less likely to have stunted children as compared to mothers who did not practice responsive feeding in Afghanistan. Mothers initiating complementary foods to their children at the age of 6 months were 2.1 times less likely to have stunted children as compared to mothers who did not initiate complementary foods at the age of 6 months to their children. Moreover, mothers complied with meal frequency as per WHO's guidelines were 2.4 times less likely to have stunted children as compared to mothers who did not practice meal frequency as per WHO's guidelines.

### **Conclusion:-**

This research study concluded that investing in promoting complementary feeding programs and strategies would assist in reducing chronic malnutrition in children in Afghanistan. It is important to increase knowledge of mothers on complementary feeding practices so that mothers realize the importance of complementary feeding practices in reducing malnutrition as well as the long-lasting social, mental, and physical impact of malnutrition on the health and well-being of children and families. Chronic malnutrition is affecting the health and well-being of children in Afghanistan. The Afghan Ministry of Health and its partners need to continue to promote appropriate complementary feeding practices to bring about a positive social change by reducing malnutrition and its long-lasting negative impact on children and families in Afghanistan.

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