

Master of Science in Public Health



“Infant And Young Child Feeding Practices Among Mothers Of Children Aged 0 -23 Months in Rural Areas of Quetta”

By

Dr. Gulalai Rehman

AL-Shifa School of Public Health, PIO,

Al-Shifa Trust Eye Hospital

Quaid- I-Azam University

Islamabad Pakistan

2022

**“Infant and young child feeding practices among mothers
of children aged 0 -23 Months in Rural Areas of Quetta”**

Dr Gulalai Rehman

-----PIO/MSPH/2020

Dissertation submitted in partial fulfilment of the requirement for the degree of

MASTER OF SCIENCE IN PUBLIC HEALTH (2022)

To

Al-Shifa School of Public Health, PIO, Al Shifa Trust Eye Hospital,

Faculty of Medicine Quaid-I-Azam University,

Islamabad

Word count

DECLARATION

In submitting this dissertation, I certify that I have read and understood the rules and regulations of ASOPH and QAU regarding assessment procedures and offences and formally declare that all work contained within this document is my own apart from properly referenced quotations.

I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments. I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

(Dr Saman Waqar)

Assistant professor public health

Al-Shifa school of public health

PIO, Al-Shifa Trust Eye hospital

Date

Gulalai Rehman

Dedicated to my parents, husband and kids

ABSTRACT

Background.

Infant and young child feeding practices in the initial 0-23months of life are very important for physical and cognitive growth of children. poor infant and young child feeding practices have a major contribution in higher stunting and wasting rate in many parts of world. Baluchistan unfortunately has a higher stunting and wasting rate, it is therefore necessary to know the infant and young child feeding practices in this territory.

Objectives.

The aim of this study was to assess the infant and young child feeding practices among the mothers of children aged 0-23months in the rural areas of Quetta, and to find out the determinant of infant and young child feeding practices in these areas.

Methodology:

This is a cross-sectional study which was carried out in rural areas of Quetta Baluchistan Pakistan. A total of 265 dyad of mother and children participated who were residents of those six villages which were randomly selected from the rural areas of Quetta. Frequencies and percentages were found out for descriptive statistics while chi square test of association was applied to determine any association in variables.

Results

Age of 27.5% of the children in the study population was between 0-6 months, 38.6% were between 6-11 months, and 34% the children were between 12-23 months age. About 56% of the study participants were males, and 44% were females. About 75% of study participants (n=280) were breastfed, and the remaining 25% were never breastfed. About 33% of the breastfed children (n=211) started breastfeeding within the first hour of life. Only 53.2% of the breastfed infants were predominantly fed exclusively with breast milk. 61.1% of the infants between 6-11 months of age were being fed according to age-appropriate breastfeeding. 42.6% of these infants were not consuming soft/semisolid/solid food. 68.5% of these infants were not consuming any meat or eggs. Similarly, 82.4% of infants were not consuming any vegetables and 88% of infants were not consuming any fruits. Only 35.2% of

these infants fulfilled the criteria of minimum meal frequency (MMF), only 15.7% of the infants fulfilled the criteria of minimum dietary diversity (MDD), and 14.8% of the infants fulfilled the criteria for minimum acceptable diet (MAD).

At the time of the study, 33.9% of children were between 12-23 months of age. 65.3% of these young children were breastfed since birth. At the time of the study, 47.4% of children were still being fed breast milk. 46.3% of the children were being fed according to age-appropriate breastfeeding. 86.3% of these children were consuming soft/semisolid/solid food. 52.6% of these children were not consuming any meat or eggs. Similarly, 62.1% of children were not consuming any vegetables and 83.2% of children were not consuming any fruits. 72.6% of these children fulfilled the criteria of MMF, only 21.1% of the children fulfilled the criteria of MDD, and 21.1% of the infants fulfilled the criteria for MAD. Binary logistic regression analysis showed that predominant breastfeeding was affected by the mother's education level, mode of delivery, and comorbidities of the mother ($p < 0.005$) when adjusted with gender. Binary logistic regression analysis also showed that MAD and MDD in the 6-11 months old group were affected by the mother's education level, but MMF was affected by the father's occupation and monthly income.

Analysis showed that model including MAD as the dependent variable in the 12-23 months old group was statistically significant ($p < 0.001$) Chi-square showed that government job of father, better income level, better maternal education level, and mother's job were also found to provide a better MAD. Mother's work status was found to affect MDD positively. Lower maternal education was related to better achievement of MMF.

Conclusion.

This study concluded that in the study population infant and young child feeding were poor, furthermore mother education level, father occupation, mode of child delivery, comorbidities of mother, mother work status and monthly income are the determinant of IYCF

ACKNOWLEDGEMENTS

Firstly, author would like to express her immense gratitude to her supervisor Dr Saman Naqvi for the continuous support, sincere advice, motivation and guidance. Her advices helped me in a true sense to complete this demanding work.

Beside supervisor author would also like to thank Dr Athaullah, assistant professor Peads department CHQ quetta, for providing support for data collection and providing logistics for research.

Author is also deeply indebted of Dr Seemi Kashif for providing continuous support and guidance., whose unconditional love and encouragement made this path easy.

Last but not least my children Hania,Sania,Immad,Alina , and Binyameen ,my better half Dr Allauddin Kakar and my loving mother without whom I could not take a single step. With prayers love and support this mission was accomplished. My biggest acknowledgement would be for my financer who bear all the expenses of this research with love and generosity without, his support this research was near to impossible. I am deeply indebted of Dr Allauddin Kakar.

Contents

ABSTRACT.....	iii
Background.....	iii
Objectives.....	iii
Methodology:.....	iii
Results.....	iii
Conclusion.....	iv
1 Introduction.....	1
1.1 Rationale.....	3
1.2 Objectives:.....	4
2 Literature Review.....	5
2.1 Definition of child undernutrition:.....	5
2.2 Epidemiology of child under nutrition:.....	5
2.3 Epidemiology of child undernutrition in Pakistan:.....	5
2.4 Causes of undernutrition:.....	6
2.4.1 Breastfeeding:.....	6
2.4.2 Complementary feeding:.....	7
2.5 Operational definitions: (WHO & UNICEF, 2021).....	11
2.5.1 Early initiation of breastfeeding:.....	11
2.5.2 Exclusive breastfeeding:.....	11

2.5.3	Continued breastfeeding at one year:	11
2.5.4	Introduction of solid, semi-solid or soft foods:.....	11
2.5.5	Minimum dietary diversity:	11
2.5.6	Minimum meal frequency:.....	11
2.5.7	Minimum acceptable diet:.....	11
2.5.8	Continued breastfeeding at two years:	11
2.5.9	Age-appropriate breastfeeding	12
3	Material and Methods	13
3.1	Study Design:	13
3.2	Study Duration:	13
3.3	Study Setting	13
3.4	Research Participants:	13
3.4.1	Inclusion Criteria:	13
3.4.2	Exclusion Criteria:	13
3.5	Sample Size Calculation:	13
3.6	Sampling strategy:.....	14
3.7	Data Collection Instrument:	16
3.7.1	Questionnaire Design:.....	16
3.7.2	Content of the Questionnaire:	16
3.7.3	Study Variables:.....	16

3.8	Data Collection Process:	16
3.8.1	Pilot Testing:.....	16
3.8.2	Formal Data Collection:.....	17
3.9	Data Analysis Procedure:	17
3.9.1	Descriptive Analysis:	17
	18
3.9.2	Inferential Analysis:.....	19
3.10	Ethical Considerations:	19
4	Results	20
4.1	Descriptive statistics:.....	20
4.1.1	Sociodemographic variables:	20
4.1.2	Breastfeeding practices in children 0-24 months old:.....	20
4.1.3	Breastfeeding practices in children 0-6 months old:.....	23
4.1.4	Infant and young child feeding (IYCF) practices in children 6-11 months old:	23
4.1.5	Infant and young child feeding (IYCF) practices in children 6-11 months old:	26
4.1.6	Infant and young child feeding (IYCF) practices in children 12-23 months old:	26
4.2	Inferential statistics:	32
4.2.1	Breastfeeding practices in children 0-6 months old:.....	32
4.2.2	Infant and young child feeding (IYCF) practices in children 6-11 months old:	34
4.2.3	Infant and young child feeding (IYCF) practices in children 12-23 months old:	34

4.2.4	IYCF practices in children 6-11 months and 12-23 months old:.....	42
5	Discussion.....	46
5.1	Strengths:.....	49
5.2	Limitations:	50
5.3	Conclusion:.....	50
5.4	Recommendations:.....	50
6	References:	51

List of Figures

Figure 1 Conceptual framework:	10
Figure 2 Sampling process.....	15
Figure 3 Data analysis plan.....	18
Figure 4 Chi-square tests between minimum acceptable diet and sociodemographic variables:.....	36

List of Tables

Table 1 Characteristics of study population:	21
Table 2 Infant and young child feeding practices (IYCFP) in 0-6 months group:	24
Table 3 Infant and young child feeding practices (IYCFP) of 6-11 months:	27
Table 4 Infant and young child feeding practices (IYCFP) of 12-23 months:	29
Table 5 Binary logistic regression analysis: (0-6 months age).....	32
Table 6: Binary logistic regression analysis: (age 6-11 months).....	35
Table 7: Binary logistic regression analysis: (age 12-23 months).....	37
Table 8: Binary logistic regression analysis: (age 6-11 months & age 12-23 months)	44

1 Introduction

Maternal and child undernutrition is widespread and detrimental in developing countries (Black et al., 2008). Internationally, more than a third of child mortality and above 10 % of the disease burden are attributable to maternal and child undernutrition (Demilew et al., 2017). Child stunting and wasting are major public health problems in low-income and middle-income countries (LMICs) (Gausman et al., 2022). Globally, over three million child deaths occur annually due to undernutrition (Gillani et al., 2022). This number accounts for 45% of total child deaths worldwide. Although there has been a reduction in global poverty and food insecurity in the previous fifty years, the prevalence of maternal and child undernutrition has not reduced in low-income and middle-income countries (LMICs) (Victora et al., 2021). The highest rate of stunting is in South Asia, where 38.9% of under-five children are stunted (Adepoju & Allen, 2019).

Additionally, early undernutrition has long lasting effects on physical as well as cognitive growth of the child. Scientific evidences suggest a link between early childhood nutrition and childhood mortality. If low-income countries follow WHO's guidelines for minimum food requirements in the first two years of life, it can reduce the mortality rate in these children by about twenty percent (Ali et al., 2021).

Unfortunately, Pakistan is the poorest performer in terms of the prevalence of malnutrition in the world. Within South Asia, the stunting and wasting rates in Pakistan were found to be 37.6% and 7.1%, respectively, the rates which are only behind the war-affected Afghanistan (Ali et al., 2021). It was found that 428 out of every 100,000 deaths in Pakistan, of children aged less than five, occurred due to malnutrition (Shahid et al., 2020). Pakistan's infant mortality rate is the highest in the world i.e., 64 infant deaths per 1000 live births in 2018 (Ali et al., 2021). Demographic and Health Survey (2017–18) showed that barely 13% of children under five years in Pakistan got the recommended minimum acceptable diet in 2018. Only 21% of these children met the minimum diet diversity requirement, and 63% met the minimum food frequency requirement (Ali et al., 2021). The prevalence of child malnutrition led to the

implementation of strategies to reduce undernutrition, during the first two years of life. These strategies are important for survival, growth, and development during the rest of life (Victora et al., 2021). The World Health Assembly, in 2012, stressed the reduction of low birth weight, childhood stunting, and wasting.

Both maternal and child undernutrition is a global public health concern, as it leads to drastic consequences, ranging from poor health outcomes to loss of economic yield and productive people (Ersino et al., 2018). Undernutrition in mothers is a major risk factor for poor health in fetuses, like poor fetal growth, low-birthweight, and poor development in the first two years of life. This, in turn, results in stunted growth and poor health later in life. Stunting is also linked with poor cognitive development, poor school performance, and hence, loss of productivity and financial gains (Ersino et al., 2018).

Scientific evidence suggests that there is a link between early childhood nutrition and childhood mortality (Karmee et al., 2017). Apart from the existing poor health of mothers, inadequate infant and young child feeding (IYCF) practices are very important determinants of undernutrition in the first two years of life (Ali et al., 2021). Infant and young child feeding practices directly impact the nutritional status and, ultimately the child survival of children less than two years of age. Malnutrition obstructs the normal growth and development of children, as well as creates a negative effect on life expectations (De & Chattopadhyay, 2019).

Exclusive breastfeeding provides essential energy and nutrients to the child, especially in the first six months of life (Ali et al., 2021; Berger et al., 2020). Breast-feeding improves emotions and strengthens the bond between the child and the mother. This bonding encourages the psychosocial development of the child. Maternal nutrition also plays a major role in improving the nutritional status of the newborn and the mother. Breast-feeding also provides learning and developmental opportunities to the infant (Berger et al., 2020). Breast milk also leads to increased intelligence quotients and better visual acuity due to the presence of special fatty acids in it (Pang et al., 2020).

After some time, exclusive breastfeeding is not sufficient for nutrients and energy for the infant (Ali et al., 2021; Berger et al., 2020). Hence, the World Health Organization (WHO) recommends the initiation of proper complementary foods with breastfeeding after six months

of birth. Consumption of complementary solid, semi-solid, or soft foods with breastfeeding contributes to the healthy development of a child after the age of six months (Taha et al., 2020; Torlesse et al., 2022). WHO also recommends the adequate consumption of iron-rich food and diversity in diet. There is a minimum recommended frequency for this diet. The complementary food that replaces breastmilk, should be dense in nutrients (Ali et al., 2021). If the food is low in nutrient density, micronutrient deficiencies can occur and an increased incidence of diarrhea is also expected, especially for children between six and 12 months.

Improvement in dietary diversity is a great challenge for poor households in South Asia because nutritious foods, like eggs, milk, meat, and some fruits and vegetables, are relatively expensive (Torlesse et al., 2022). Along with this fact, social inequalities involving women and children also play a key role in poverty and less education (Victora et al., 2021). Social, financial, political, and environmental factors are the main causes of child undernutrition (George et al., 2020; Krishna et al., 2018). Undernutrition in mothers is a major risk factor for poor health in fetuses, like poor fetal growth, low-birthweight, and poor development in the first two years of life. This, in turn, results in stunted growth and poor health later in life. Stunting is also linked with poor cognitive development, poor school performance, and hence, loss of productivity and financial gains (Ersino et al., 2018).

The data on IYCFP at a national level in Pakistan, particularly in Baluchistan, is scarce. This study was supposed to bridge the gap in this area.

1.1 Rationale

Malnutrition continues to be a major health issue for decades in the province of Baluchistan. National Nutrition Survey (NNS)-2018 of Pakistan showed an alarmingly high level of malnutrition among children and women in the province. The findings from the survey showed that since 1997 the prevalence of wasting (low weight for height) among young children was on the rise, i.e., from 8.6% -15.1% in 2011 to 17.7% in 2018 in Pakistan. In Baluchistan, the prevalence of wasting had increased to 18.9%, according to the NNS-2018, which was recorded as 16% according to NNS- 2011. This is considered to be the highest rate of wasting in Pakistan's history. NNS-2018 also revealed that in Baluchistan 46.6% of children under five years of age suffer from chronic stunting (low height for age). The

nutritional status of women, particularly pregnant and lactating, remains poor due to various factors. The number of Women of Reproductive Age (15-49 years), having BMI <18.5, was 14.5% in Baluchistan. This situation is quite alarming and calls for taking immediate action on part of the Government of Baluchistan to address this most serious public health issue.

Baluchistan Province, Pakistan, has one of the poorest nutrition indicators. An understanding of the determinants of poor complementary feeding practices is a necessary step in order to design, plan and implement effective and sustainable interventions to improve the nutrition needs of children aged 6–23 months. Hence, it is crucial to identify the key determinants affecting and hindering the appropriate IYCF practices in Baluchistan and to address each by developing a targeted strategy. There is a paucity of studies on infant and young child feeding (IYCF) practices among mothers in Pakistan, particularly in Baluchistan Province. The aim of the present study is to understand the prevalent IYCF practices among mothers of children aged 0-23 months in rural area of Quetta district. This will be the first study in the province on infant and young child feeding practices among mothers of children aged 0-23 months and will be important in the context of emergency situation of malnutrition among under-five children, as declared by the provincial government. This study will incorporate the WHO indicators to assess IYCF practices and reasons for inadequacy in these practices in rural areas of Quetta. This study will help the policymakers to come up with a strategy for mothers to enhance the IYCF practices in Baluchistan.

1.2 Objectives:

- To investigate the infant and young child feeding (IYCF) practices among mothers in a rural area of Quetta in relation to WHO recommendations.
- To find out the associated factors of infant and young child feeding practices.

2 Literature Review

2.1 Definition of child undernutrition:

Child undernutrition generally refers to a condition in which food is taken by the child in an inadequate amount. This inadequate diet is hence unable to meet a child's needs for physiological function, growth, and the ability to respond to illness (Wells et al., 2019). Nutritionists have categorized undernutrition into two major types since the 1970s. Undernutrition is categorized either as wasting or stunting. Wasting means that the weight of the child is low for the height of the child, and/or small mid-upper arm circumference of the child in relation to height. Stunting means that child has a low height for the age. The period starting from birth to two years of age is a critical period in the life of children for optimal growth and development, and poor nutrition during this time leads to malnutrition in many infants (Arikpo, et al., 2018). Most cases of stunting occur in the first two years of life due to increased demand for adequate nutrition for growth and development.

2.2 Epidemiology of child under nutrition:

South Asia has the highest rate of stunting, where about 39% of children under five years of age are stunted, and wasting affects about 27 million children living in South Asia (Adepoju & Allen, 2019). Nearly 50% of stunted children in the world live in Bangladesh, India, and Pakistan. The prevalence of all types of malnutrition is above acceptable threshold levels in Pakistan, India, and Bangladesh. Stunting is present in about 30% of children, and wasting is present in 15% of children under five years of age in these countries (Khaliq et al., 2021).

2.3 Epidemiology of child undernutrition in Pakistan:

Pakistan has been a poor performer in relation to nutrition for women and children (Amjad & Akbar, 2020). But the most affected population in Pakistan, in relation to nutrition, is under five years of age, which includes future mothers. Within South Asia, the stunting and wasting rates in Pakistan were found to be only behind the war-affected Afghanistan (Ali et al., 2021). According to NNS-2018 Pakistan, four out of 10 children are stunted, almost one out of three children are underweight, and 17.7% suffer from wasting. Although the literature shows studies related to malnutrition and its determinants in Pakistan, not much data has been found at the provincial level on indicators related to child nutrition. Most of the studies focused on

Sindh and Punjab provinces. Most of the studies focused on the rural areas in Sindh province (Ahmad et al., 2020). Most of the studies in Punjab were conducted in central Punjab. Only one study was done in the area of southern Punjab which has a very large population. Different regional studies showed varied results in terms of stunting and wasting, according to the province and their methodology. In Khyber Pakhtunkhwa (KPK) province, 12.5% of children were found to be stunted and 7% were wasted (Asim & Nawaz, 2018). Another study from another area of KPK showed that 14% of children are underweight, and 8% were stunted. One out of two (48%) children were found to be stunted and 10% were wasted in Baluchistan province (Asim & Nawaz, 2018). In Sindh province, the situation of children was alarming in different studies in relation to stunting and wasting. Rural Sindh reported that 61% of children were stunted and 47% were wasted. Yet another study showed that all forms of malnutrition in children were in much higher numbers in Sindh and Baluchistan as compared to other regions of Pakistan. Baluchistan and Sindh provinces have always remained neglected in relation to human development in past decades (Shahid et al., 2022).

2.4 Causes of undernutrition:

Wasting indicates recent and severe weight loss while stunting is an indication of chronic or recurrent under-nutrition due to inadequate quantity or quality of food or prolonged illnesses. Scientific evidence shows that there is a relationship between early childhood nutrition and childhood mortality (Karmee et al., 2017). Poor health of mothers, as well as inadequate infant and young child feeding (IYCF) practices, are very important determinants of undernutrition in the first two years of life (Ali et al., 2021). Infant and young child feeding practices directly affect the nutritional status. Nutritional status is important for the survival of children less than two years of age. Malnutrition creates a negative effect on life expectations (De & Chattopadhyay, 2019).

2.4.1 Breastfeeding:

Exclusive breastfeeding provides essential energy and nutrients to the child, especially in the first six months of life (Ali et al., 2021; Berger et al., 2020; Saleem et al., 2021). Breast milk also leads to increased intelligence quotients and better visual acuity due to the presence of special fatty acids in it (Pang et al., 2020). But breastfeeding needs to be continued along with

complementary feeding according to UNICEF. Maternal nutrition also plays a major role to improve the nutritional status of the newborn and the mother.

2.4.2 Complementary feeding:

Complementary feeding is defined as, "the process starting when breast milk alone or infant formula alone is no longer sufficient to meet the nutritional requirements of infants, and therefore, other foods and liquids are needed, along with breast milk or a breastmilk substitute" (World Health Organization & UNICEF, 2008). It is the time of shifting from breast milk or breast-milk substitute to foods that the family eats, and covers, "introducing a range of foods gradually until the baby is eating the same foods as the rest of the family" (World Health Organization, 2000). Complementary feeding is a universal practice, but the ways in which it is practiced vary between cultures, socioeconomic groups, and even individuals. The recommended time for initiation of complementary foods is six months of age (World Health Assembly, 2001), but when breast milk alone is insufficient for the infant, complementary feeding can be initiated before this time (Arikpo, et al., 2018).

2.4.2.1 Epidemiology of Infant and young child feeding (IYCF) practices:

About 5 million deaths in children younger than 5 years occur annually, globally (Wells et al., 2019). Malnutrition alone is responsible for 67% of child deaths in India (Karmee et al., 2017). In India, common problems are not only inadequate breastfeeding but also harmful practices of child feeding. The majority of the kids, aged six to 23 months, were not fed as recommended by Infant and child feeding (IYCF) practices (Nurokhmah et al., 2022). In Pakistan, 64 deaths per 1000 live births occur in children under five years of age (Khan, 2020). Complementary feeding practices, like minimum dietary diversity (MDD), minimum meal frequency (MMF), minimum acceptable diet (MAD), and breastfeeding for two years are very low in Pakistan. Minimum dietary diversity (MDD) is only 14.2%, minimum meal frequency (MMF) is only 18.2%, minimum acceptable diet (MAD) is merely 3.6%, and breastfeeding till two years is present in only 56.5% of cases, which is much below acceptable levels (Ariff et al., 2020).

2.4.2.2 Barriers to IYCF practices in Pakistan:

Barriers to the implementation of IYCF practices need to be addressed so that undernutrition in children can be overcome. Traditional recipes, convenience, and taste preferences are probably larger barriers than affordability to the intake of important nutrients. For example, dark leafy greens were consumed by only 50% to 60% of households in Pakistan. Grains, tubers, and legumes predominate complementary feeding in Pakistan. Only a few studies discussed dietary diversity as recommended by WHO IYCF guidelines, hence the actual number of infants consuming diverse foods seemed to be low (Manikam et al., 2018).

Inappropriate complementary foods included tea, which besides reducing appetite, impairs iron absorption which may lead to anemia (Manikam et al., 2018). Even when complementary feeding is initiated, it is often not given three or four times daily. Household poverty also results in decreased affordability of nutritious foods like meat and seasonal fruits (Torlesse et al., 2022). Interventions could focus on these barriers to increase the consumption of affordable sources of micronutrients (Ryckman et al., 2021). The indicators of complementary feeding were low among the poor, in the rural setups, and in mothers with a low level of education (Tariqujjaman et al., 2022). Better socioeconomic status and media exposure might result in better awareness about appropriate IYCF practices, hence improving health outcomes in children, including nutrition (Dhami et al., 2021).

The use of commercial complementary foods is common in Pakistan due to doctors' recommendations, media advertising, and the easy availability of such foods. The barriers to proper IYCF practices due to maternal factors include lack of maternal knowledge on complementary feeding, cultural beliefs, higher parity of mother, insufficient breast milk, working mother, and early consecutive pregnancy (Manikam et al., 2018). A post-intervention study was also done in Pakistani rural areas to compare the pre- and post- health interventions related to knowledge, attitude & practices of mothers regarding IYCF (Akber, et al., 2020). Study concluded with the impression that socio-cultural and socio-economic barriers, restricting access of mothers to information related to IYCF practices, must be reduced, in order to decrease the burden of malnutrition. Study suggested that maternal literacy was an important factor along with healthcare services, to implement IYCF practices. Higher

maternal education increases women's chances of employment and empowers women to make proper decisions regarding IYCF practices. Although some studies showed that women in employment have advantages of improving earnings and health-related decisions for IYCF, other studies indicated that housewives also have advantages regarding appropriate IYCF (Dhami et al., 2021). A housewife has enough time and support for appropriate IYCF practices, and the mother is not distracted by external work activities.

Health services that include breastfeeding counseling are also strongly associated with appropriate IYCF practices (Nurokhmah et al., 2022). In Pakistan, male children were more likely to be appropriately fed, and higher birth order was also associated with better IYCF practices. In India, studies show that there is a great desire for male children, and this preference may have an impact on child health and nutrition (Dhami et al., 2021). Higher birth order shows that an experienced mother gives appropriate infant feeding because she might be more aware of the type of food to give to the child at every stage.

IYCF practice assessment in Pakistan: No social and behavioral change regarding complementary feeding was observed in Pakistan's Infant and Young Child Feeding (IYCF) strategy (2016-2020), formulated in 2015. National Complementary Feeding Assessment (NCFA) was devised to generate evidence in beliefs and behaviors, in order to understand the barriers to optimal feeding practices across various provinces of Pakistan (Nasir, et al., 2020). NCFA reported that affordability was the main problem in accessing nutritious foods during the complementary feeding time, especially meat, fruits, and eggs. Despite affordability problems, mothers and health caregivers prefer more expensive foods such as infant cereals, for the sake of convenience, and due to a belief, that they are more nutritious. Along with this fact, households in rural areas sell nutritious foods such as eggs and milk to get cash.

Availability of the main food items was not found to be a barrier, except in difficult geographical terrains such as mountainous regions (Shuja et al., 2022). NCFA also found that children aged less than two years were fed the same food as the rest of the family. Dietary preferences also restricted the consumption of nutritionally rich and cheaper foods, like millet, while the consumption of unhealthy processed foods like chips and biscuits was common. Hence, a lack of knowledge among healthcare providers as well as family members was found

to be an important influencer of complementary feeding practices in Punjab province, Pakistan (Nasir, et al., 2020). NFCA also found vitamin A, iron, zinc, calcium, and folate to be important nutrients lacking in the complementary diet. Vitamins B1, B3, B6, and B12 were lacking but to a lesser extent. The analysis of diet also showed that these lacking nutrients could be increased by increasing consumption of roti, eggs, and milk, along with home-based fortification (Shuja et al., 2022). Supplementation was also suggested to fill dietary gaps in vitamin A, iron, and zinc.

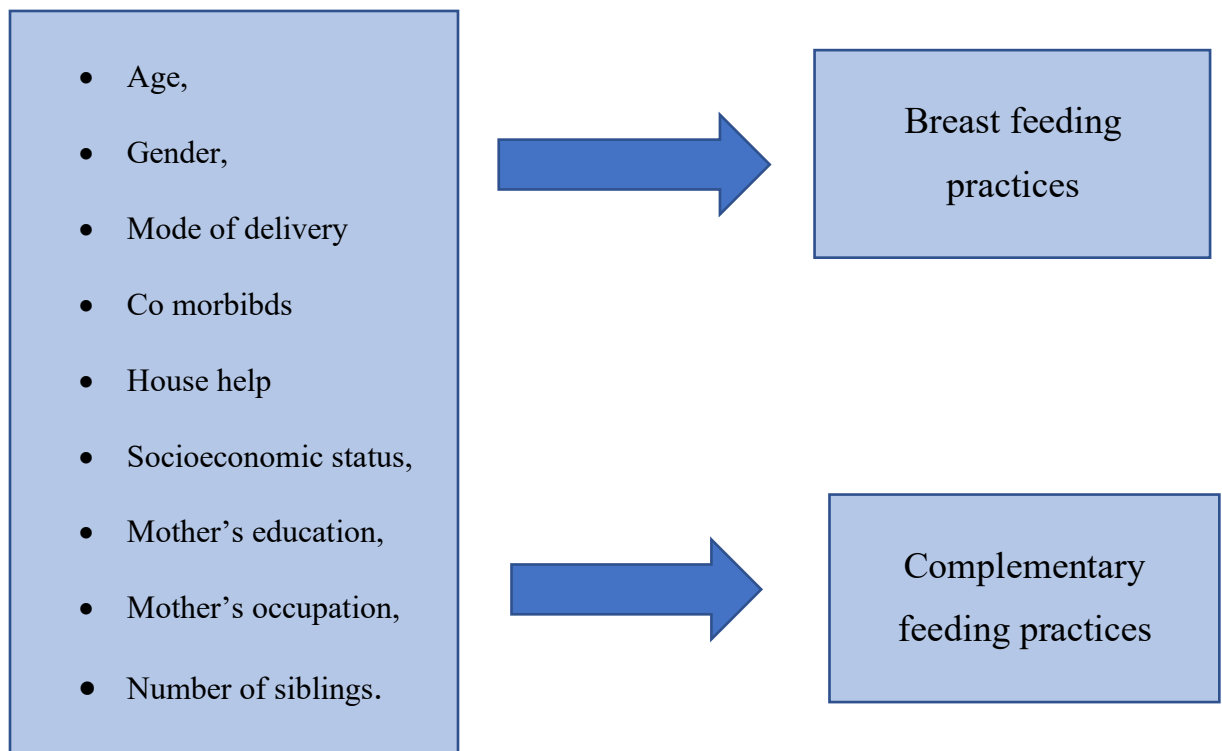


Figure 1 Conceptual framework:

2.5 Operational definitions: (WHO & UNICEF, 2021)

2.5.1 Early initiation of breastfeeding:

Children, born in last 24 months, who received breast milk within one hour of birth.

2.5.2 Exclusive breastfeeding:

Infants, from day one to five months of age, who received only breast milk and nothing else, not even water during the previous day.

2.5.3 Continued breastfeeding at one year:

Children, 12 to 15 months of age, who received breast milk during the previous day.

2.5.4 Introduction of solid, semi-solid or soft foods:

Infants, six to eight months of age, who received solid, semi-solid or soft foods during the previous day.

2.5.5 Minimum dietary diversity:

Children six to 23 months of age who received foods from four or more food groups during the previous day.

2.5.6 Minimum meal frequency:

Breastfed and non-breastfed children, six to 23 months of age, who receive solid, semi-solid, or soft foods the minimum number i.e. 4 or more times during the previous day.

2.5.7 Minimum acceptable diet:

Children, six to 23 months of age, who receive a minimum acceptable diet (apart from breast milk) during the previous day.

- for breastfed children: receiving at least the minimum dietary diversity and minimum meal frequency for their age during the previous day;
- for non-breastfed children: receiving at least the minimum dietary diversity and minimum meal frequency for their age during the previous day as well as at least two milk feeds.

2.5.8 Continued breastfeeding at two years:

Children 20 to 23 months of age, who received breast milk during the previous day.

2.5.9 Age-appropriate breastfeeding

Infants 0–5 months of age who received only breast milk during the previous day, and children 6–23 months of age who received breast milk, as well as solid, semi-solid or soft foods, during the previous day. Predominant breastfeeding under six months Infants 0–5 months of age who received breast milk as the predominant source of nourishment during the previous day

3 Material and Methods

3.1 Study Design:

It was a cross-sectional study, among mothers of children 0 months–23 months in rural areas of Quetta. Data was collected once only using questionnaire of WHO for key indicators of IYCF which was adapted for this population. reliability of the questionnaire was checked after pilot study.

3.2 Study Duration:

The study period for the current research was six months (March, 2022- September, 2022)

3.3 Study Setting

The study was conducted in a rural area of Quetta, Baluchistan, Pakistan.

3.4 Research Participants:

Pair of mothers and children from 0-23 months of age, are the participant of the study.

3.4.1 Inclusion Criteria:

Only children from 0-23 months of age were recruited for the study, who were accompanied by mothers.

3.4.2 Exclusion Criteria:

1. Children above two years of age.
2. Those children not accompanying their mother, for whatever reason, were excluded.
3. sick children

3.5 Sample Size Calculation:

A sample size of **265** was calculated after adding the prevalence of 46.6% of stunting in Baluchistan province, according to National Nutritional Survey of Pakistan 2017-2018. The following formula was used (Pourhoseingholi et al., 2013):

$$\text{Sample size} = z^2 \times p (1- p) / E^2 = (1.96)^2 \times 0.466 (1- 0.466) / (0.06)^2 = \mathbf{265}$$

- z = z-score of 1.96, when confidence level is set at 95%
- p = Prevalence of 46.6% of stunting under five-years age in Baluchistan
- E = Margin of error = 6 %

3.6 Sampling strategy:

A proportionate two stage simple random and stratified random sampling was used to select the study subjects. Proportionate random sampling assured a proportionate representation from each study town. In the first stage 6 out of 45 villages were selected, using simple random sampling. Two villages were selected from each town. In the next phase stratified random sampling was used for selection of household from each village. Sample size was divided proportionately among the villages. In each household only one pair of mother and child was selected. If there were more than two pair of mother and child, the one with younger child was selected as study participant.

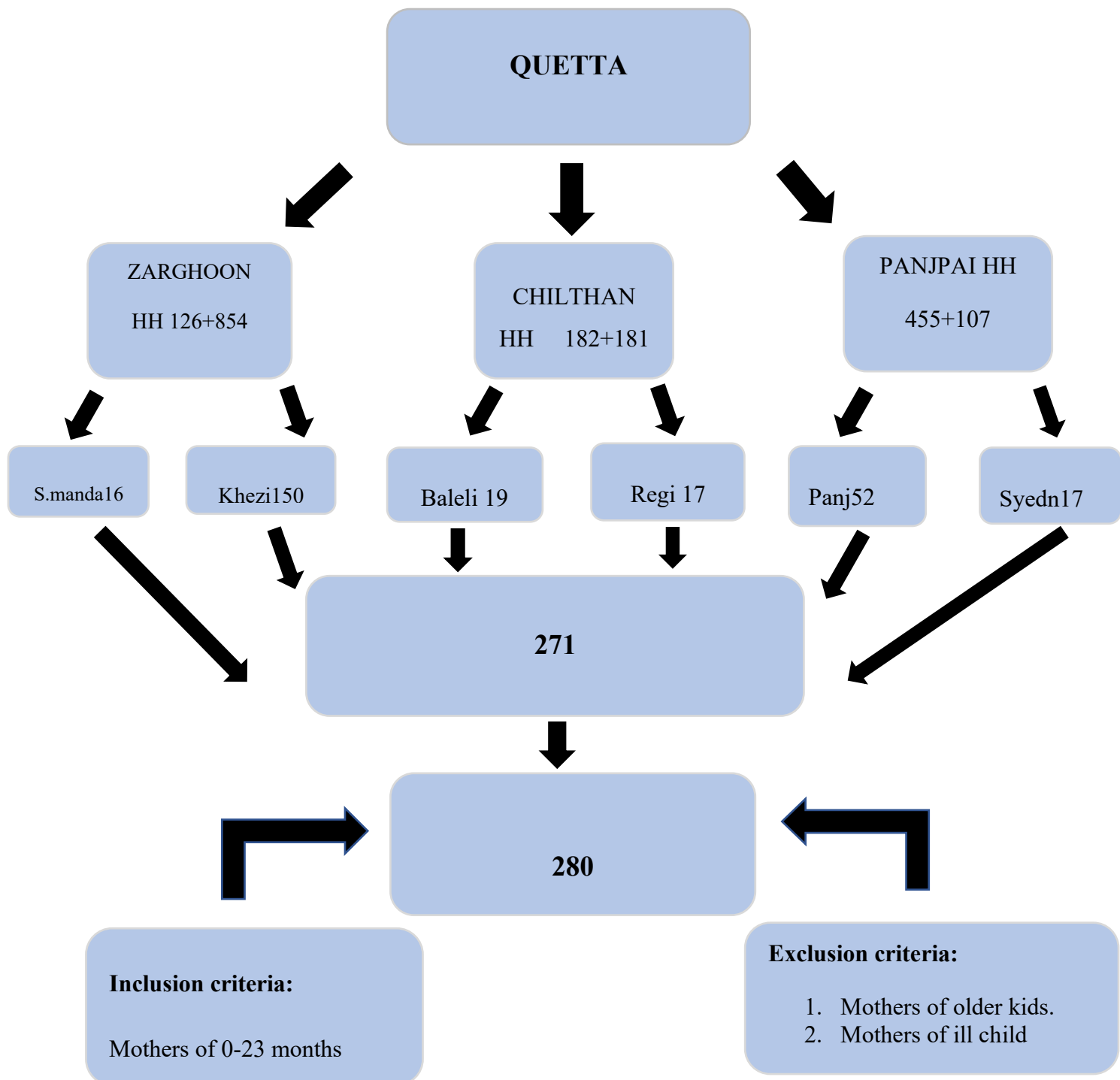


Figure 2 Sampling process

3.7 Data Collection Instrument:

3.7.1 Questionnaire Design:

A pre-validated questionnaire, primarily based on the standard questionnaire on IYCF practices given by WHO, was used for data collection. These questions provided the data required to calculate the 10 key indicators of IYCF. As per WHO recommendations, information was collected about the child's diet in the previous 24 hours, which comprised the sort of food items and the frequency they had consumed. Food items were classified into seven types, that is, cereals, legumes, dairy products, meat products, eggs, and vegetables, and fruits. The questionnaire is attached as Annexure-A.

3.7.2 Content of the Questionnaire:

The questionnaire contained four major sections:

1. First part included questions related to socio-demographic characteristics.
2. Second part included questions related to breast and complementary feeding practices.

3.7.3 Study Variables:

3.7.3.1. Outcome variable:

The major construct of the questionnaire was to assess the breast and complementary feeding practices in these children.

3.7.3.2. Independent Variable:

Socio-demographic variables such as age, gender, education level, socioeconomic status, and the number of siblings.

3.8 Data Collection Process:

3.8.1 Pilot Testing:

Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size. The reliability of the data was checked after entering data into SPSS.

3.8.2 Formal Data Collection:

Data was collected by the researcher herself and one other data collector who were formerly trained for this purpose. It was community-based study, so data was collected from six villages of three towns of Quetta district. Different households were randomly selected using proportionate stratified random sampling. In each household only one pair of child and mother was selected. All the study participants were approached. Consent was taken from all participants. After taking the consent, they were interviewed and their responses were recorded by the researcher. Data collection was completed in approximately two months.

3.9 Data Analysis Procedure:

Data was entered in Statistical Package for Social Sciences (SPSS) version 21. After careful data entry, data were checked for any errors before proceeding to the analysis. Demographic and outcome variables were mostly categorical, so percentages and frequencies were run for these variables. Binary logistic regression was run between the categorical variables to find any statistically significant positive or negative correlation.

3.9.1 Descriptive Analysis:

Descriptive statistics were generated for socio-demographic characteristics. For categorical variables, data was summarized in the form of frequencies and percentages and presented in table form, and graphs. Descriptive analysis was run for all variables.

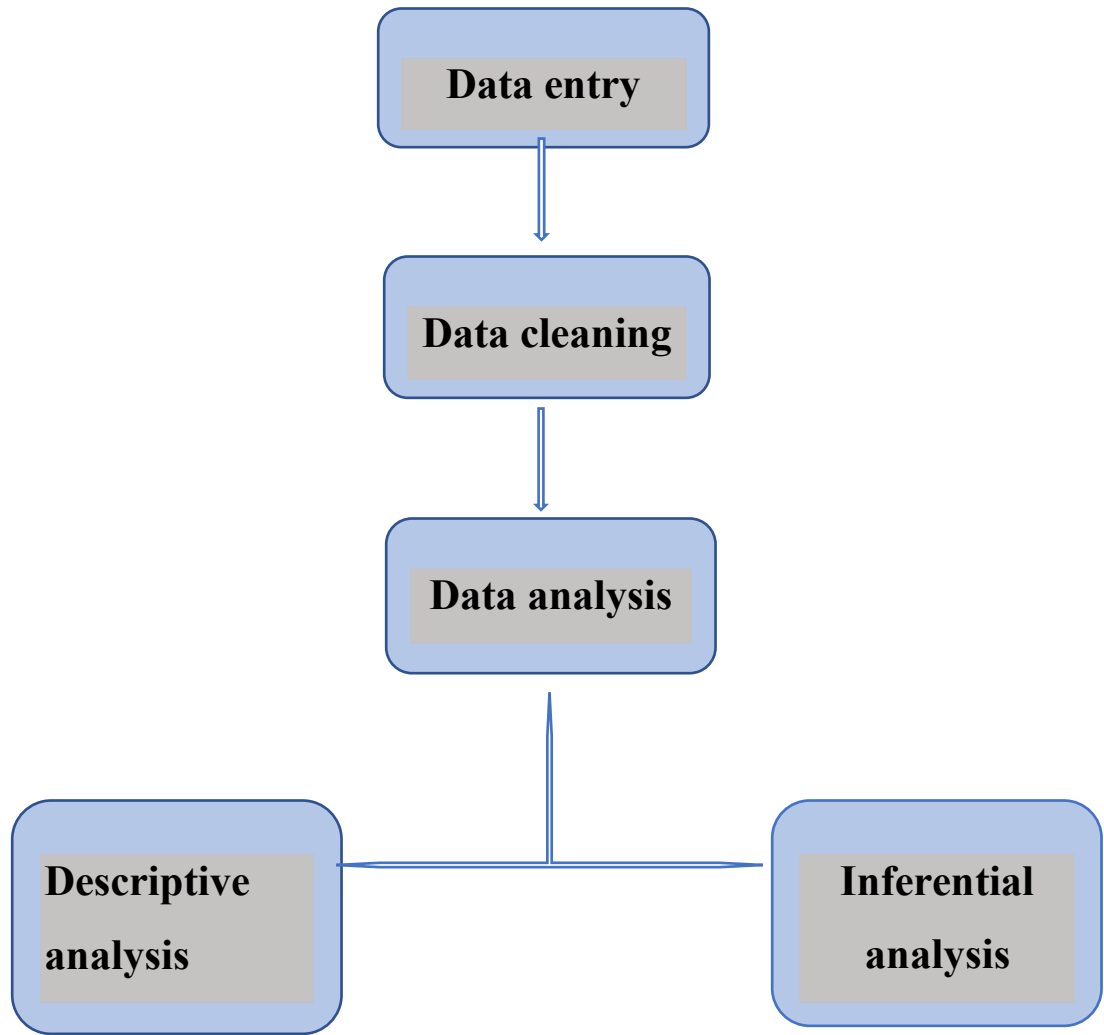


Figure 3 Data analysis plan

3.9.2 Inferential Analysis:

Spearman correlation and chi-square was run between the different variables.

3.10 Ethical Considerations:

Before starting formal data collection, approval from the Institutional Review Board (IRB) of Al-Shifa School of Public Health Rawalpindi, Pakistan was taken. A permission letter from the Head of Department of Al-Shifa School of Public Health was obtained. The purpose of the study was explained to the participants the purpose of the research and written consent was taken from each participant. Participants were assured of the confidentiality of their data.

4 Results

4.1 Descriptive statistics:

4.1.1 Sociodemographic variables:

The total number of study participants was 280 (Table 1). About 33% of the population was from rural areas of Quetta and Chiltan, 26.1% were from Loralai and Zarghoon, and 40.7% were from Panipat and Turbat. The age of 27.5% of the children was between 0-6 months, 38.6% were between 6-11 months, and 34% of the children included in the study were between 12-23 months age. About 56% of the study participants were males, and the remaining 44% were females.

About 67% of the children were born through spontaneous vaginal delivery (SVD) and the remaining 33% were born by Cesarean section (Table 1). About 23% of mothers were hypertensive and about 22% of mothers were diabetic. About 60% of the mothers in our study group were illiterate (Table 1). Only around 12% of the mothers were educated above the bachelor's level. The remaining about 30% of mothers were educated between primary and secondary levels. Only about 10% of the mothers were working women, remaining about 90% of the mothers were housewives. About 60% of the mothers had house help for mothers in form of housemaids. The remaining 40% of mothers took care of their families alone (Table 1).

Fathers of 20% of the children were government servants, and about 44% were either farmers, owned small businesses, or worked on daily wages (Table 1). Fathers of the remaining 36% of children were either unemployed, has passed away, or had divorced their wives and left the children. About 40% of the families had a monthly income below Rs. 20,000, and about 40% of families had an income between Rs. 20,000 and 80,000. The remaining 20% of families had monthly income above Rs. 80,000.

4.1.2 Breastfeeding practices in children 0-24 months old:

About 75% of all study participants (n=280) were breastfed, and the remaining 25% were never breastfed (Table 1). About 33% of the breastfed children (n=211) started breastfeeding within the first hour of life, and about 75% of all the breastfed children started breastfeeding within the first 24 hours of life (Table 1).

Table 1 Characteristics of study population:

	Frequency	Percent (%)
Area: (n=280)		
Quetta, Chiltan	93	33.2
Loralai, Zarghoon	73	26.1
Panjpai, Turbat	114	40.7
Age: (n=280)		
0-6months	77	27.5
6-11months	108	38.6
12-23months	95	33.9
Gender: (n=280)		
Male	156	55.7
Female	124	44.3
Mother's comorbidity:		
Hypertension	65	23.2
Diabetes	61	21.8
Others	154	55.0
Mode of delivery: (n=280)		
SVD	187	66.8
Cesarean section	93	33.2
Father's occupation: (n=280)		
Govt servant	56	20.0
Self-employed /farmer/daily wages	122	43.6
Unemployed/deceased/divorce	102	36.4

Monthly income: (n=280)		
Less than Rs. 20,000	114	40.7
Rs. 20,000 to 80,000	111	39.6
More than Rs. 80,000	55	19.6
Mother's education level: (n=280)		
No formal education	164	58.6
Primary	41	14.6
Secondary	42	15.0
Bachelor or higher	33	11.8
Mother's job status: (n=280)		
Housewife	250	89.3
Working mother	30	10.7
House-maid: (n=280)		
Yes	171	61.1
No	109	38.9
Ever breastfed: (n=280)		
Yes	211	75.4
No	69	24.6
Timing of initiation of breastfeeding: (n=211)		
Within first hour	69	32.7
Within first 24 hours	92	43.6
After first 24 hours	50	23.7

4.1.3 Breastfeeding practices in children 0-6 months old:

Total number of infants of age 0-6 months in the study group was 77. 83.1% of these infants were breastfed (Table 2). In 29.6% of these breastfed infants (n=64), breastfeeding was started within the first hour of birth. 43.7% of these infants, feeding was started after one hour but within the first 24 hours of birth. At the time of the interview for the study, 84.3% of the breastfed infants (n=64) were still on breast milk (Table 2). Out of these breastfed infants (n=54), 88.9% of infants took breast milk more than 4 times per day.

53.2% of the breastfed infants were predominantly fed exclusively with breast milk (Table 2). The remaining infants were fed with other types of milk and foods. 23.4% of these infants were either solely fed with, or supplemented by formula milk. Similarly, 16.9% of these infants were either solely fed with, or supplemented by cow/goat milk. 11.7% of these infants were fed soft/semisolid/solid food before 6 months of age (Table 2).

4.1.4 Infant and young child feeding (IYCF) practices in children 6-11 months old:

At the time of the study, 108 (38.6%) children were between 6-11 months of age. 78.7% of these infants were breastfed since birth (Table 3). 29.4% of these infants (n=85) started breastfeeding within one hour of birth, and 43.5% of these infants started breastfeeding after one hour but within the first 24 hours of birth. At the time of the study, about 64.8% of infants were still being fed breast milk (Table 3). Out of these infants (n=70), about 67.1% of the infants were fed with breastmilk more than 4 times per day, on the previous day of the study. 61.1% of the infants were being fed according to age-appropriate breastfeeding (Table 3). 63% of the infants were also consuming cow/goat milk or formula milk, but only 30.6% of these infants had consumed this milk on the previous day of the study. 42.6% of these infants were not consuming soft/semisolid/solid food (Table 3). 33.3% of these infants were consuming solid/semisolid food, and 24.1% of infants were consuming soft food (Table 3). 68.5% of these infants were not consuming any meat or eggs. Similarly, 82.4% of infants were not consuming any vegetables and 88% of infants were not consuming any fruits.

Only 35.2% of these infants fulfilled the criteria of minimum meal frequency, only 15.7% of the infants fulfilled the criteria of minimum dietary diversity, and 14.8% of the infants fulfilled the criteria for minimum acceptable diet (Table 3).

Table 2 Infant and young child feeding practices (IYCFP) in 0-6 months group:

	Frequency	Percent (%)
Ever breastfed: (n=77)		
Yes	64	83.1
No	13	16.9
Timing of initiation of breastfeeding: (n=64)		
Within first hour	19	29.6
Within first 24 hours	28	43.7
After first 24 hours	17	26.5
Is the child currently breastfed: (n=64)		
Yes	54	84.3
No	10	15.6
How many times yesterday, during day and night, the baby was breastfed: (n=54)		
Less than 4 times	6	11.1
More than 4 times	48	88.9
Predominant breastfeeding: (n=77)		
Yes	41	53.2
No	36	46.7

Milk source: (n=77)		
Nil	3	3.9
Cow/goat milk	13	16.9
Formula milk	18	23.4
Breast milk	43	55.8
Mix-milk feeding: (n=77)		
Not applicable	4	5.2
Breast milk only	40	51.9
Breast milk and other foods or fluid	15	19.5
Bottled milk	18	23.4
Solid/semisolid food: (n=77)		
Nil	68	88.3
Solid or semisolid	6	7.8
Soft food	3	3.9

4.1.5 Infant and young child feeding (IYCF) practices in children 6-11 months old:

At the time of the study, 108 (38.6%) children were between 6-11 months of age. 78.7% of these infants were breastfed since birth (Table 3). 29.4% of these infants (n=85) started breastfeeding within one hour of birth, and 43.5% of these infants started breastfeeding after one hour but within the first 24 hours of birth. At the time of the study, about 64.8% of infants were still being fed breast milk (Table 3). Out of these infants (n=70), about 67.1% of the infants were fed with breastmilk more than 4 times per day, on the previous day of the study.

61.1% of the infants were being fed according to age-appropriate breastfeeding (Table 3). 63% of the infants were also consuming cow/goat milk or formula milk, but only 30.6% of these infants had consumed this milk on the previous day of the study.

42.6% of these infants were not consuming soft/semisolid/solid food (Table 3). 33.3% of these infants were consuming solid/semisolid food, and 24.1% of infants were consuming soft food (Table 3). 68.5% of these infants were not consuming any meat or eggs. Similarly, 82.4% of infants were not consuming any vegetables and 88% of infants were not consuming any fruits.

Only 35.2% of these infants fulfilled the criteria of minimum meal frequency, only 15.7% of the infants fulfilled the criteria of minimum dietary diversity, and 14.8% of the infants fulfilled the criteria for minimum acceptable diet (Table 3).

4.1.6 Infant and young child feeding (IYCF) practices in children 12-23 months old:

At the time of the study, 95 (33.9%) children were between 12-23 months of age. 65.3% of these young children were breastfed since birth (Table 4). 37% of these children (n=62) started breastfeeding within one hour of birth, and 43.5% of these children started breastfeeding after the first hour but within the first 24 hours of birth. At the time of the study, 47.4% of children were still being fed breast milk (Table 4). Out of these children (n=45), about 66.7% were fed with breastmilk more than 4 times per day, on the previous day of the study.

46.3% of the children were being fed according to age-appropriate breastfeeding (Table 4). 63.2% of the children were also consuming cow/goat milk or formula milk, but only 43.2% of these children had consumed this milk on the previous day of the study.

Table 3 Infant and young child feeding practices (IYCFP) of 6-11 months:

Table 3: Infant and young child feeding practices (IYCFP) of 6-11 months:		
	Frequency	Percent (%)
Ever breastfed: (n=108)		
Yes	85	78.7
No	23	21.3
Timing of initiation of breastfeeding: (n=85)		
Within first hour	25	29.4
Within first 24 hours	37	43.5
After first 24 hours	23	27.0
Is the child currently breastfed: (n=108)		
Yes	70	64.8
No	38	35.2
How many times yesterday, during day and night, the baby was breastfed: (n=70)		
Less than 4 times	23	32.8
More than 4 times	47	67.1
Age-appropriate breastfeeding: (n=108)		
Yes	66	61.1
No	42	38.9
Times child consumed 2 or more than 2 milk feed during the previous day: (n=108)		
Not applicable	36	33.3
Yes	33	30.6
No	39	36.1
Milk source: (n=108)		
Nil	3	2.8
Cow/goat milk	22	20.4
Formula milk	46	42.6

Breast milk	37	34.3
Solid/semisolid food: (n=108)		
Nil	46	42.6
Solid or semisolid	36	33.3
Soft food	26	24.1
Consumption of meat/eggs: (n=108)		
< 2 times/day	25	23.1
> 2 times/day	9	8.3
No intake	74	68.5
Consumption of vegetables: (n=108)		
< 2 times/day	11	10.2
> 2 times/day	8	7.4
No intake	89	82.4
Consumption of fruits: (n=108)		
< 2 times/day	9	8.3
> 2 times/day	4	3.7
No intake	95	88.0
MMF¹: (n=108)		
Yes	38	35.2
No	70	64.8
MDD²: (n=108)		
Yes	17	15.7
No	91	84.3
MAD: (n=108)		
Yes	16	14.8
No	92	85.2
¹ Minimum meal frequency, ² Minimum dietary diversity, ³ Minimum acceptable diet		

Table 4 Infant and young child feeding practices (IYCFP) of 12-23 months:

Table 4: Infant and young child feeding practices (IYCFP) of 12-23 months:		
	Frequency	Percent (%)
Ever breastfed: (n=95)		
Yes	62	65.3
No	33	34.7
Timing of initiation of breastfeeding: (n=62)		
Within first hour	23	37.0
Within first 24 hours	27	43.5
After first 24 hours	12	19.3
Is the child currently breastfed: (n=95)		
Yes	45	47.4
No	50	52.6
How many times yesterday, during day and night, the baby was breastfed: (n=45)		
Less than 4 times	15	33.3
More than 4 times	30	66.7
Age-appropriate breastfeeding: (n=95)		
Yes	44	46.3
No	51	53.7

Milk source: (n=95)		
Nil	18	18.9
Cow/goat milk	20	21.1
Formula milk	40	42.1
Breast milk	17	17.9
Times child consumed 2 or more than 2 milk feed during the previous day: (n=95)		
Not applicable	26	27.4
Yes	41	43.2
No	28	29.5
Solid/semisolid food: (n=95)		
Nil	13	13.7
Solid or semisolid	65	68.4
Soft food	17	17.9
Times child ate solid/semi-solid/soft food previous day: (n=95)		
Not applicable	7	7.4
1-3 times	80	84.2
>3 times	8	8.4
Consumption of meat/eggs: (n=95)		
< 2 times/day	35	36.8
> 2 times/day	10	10.5
No intake	50	52.6
Consumption of vegetables: (n=95)		

< 2 times/day	29	30.5
> 2 times/day	7	7.4
No intake	59	62.1
Consumption of fruits: (n=95)		
< 2 times/day	13	13.7
> 2 times/day	3	3.2
No intake	79	83.2
MMF¹: (n=95)		
Yes	69	72.6
No	26	27.3
MDD²: (n=95)		
Yes	20	21.1
No	75	78.9
MAD³: (n=95)		
Yes	20	21.1
No	75	78.9
¹ Minimum meal frequency, ² Minimum dietary diversity, ³ Minimum acceptable diet		

86.3% of these children were consuming soft/semisolid/solid food, out of which 68.4% of these children were consuming solid/semisolid food, and 17.9% of children were consuming soft food (Table 4). 52.6% of these children were not consuming any meat or eggs. Similarly, 62.1% of children were not consuming any vegetables and 83.2% of children were not consuming any fruits. 72.6% of these children fulfilled the criteria of minimum meal frequency (MMF), only 21.1% of the children fulfilled the criteria of minimum dietary diversity, and 21.1% of the infants fulfilled the criteria for minimum acceptable diet (Table 4).

4.2 Inferential statistics:

4.2.1 Breastfeeding practices in children 0-6 months old:

Binary logistic regression analysis showed that predominant breastfeeding was affected by the mother's education level, mode of delivery, and comorbidities of the mother ($p < 0.005$) when adjusted with gender (Table 5). A lower education level was found to be associated with predominant breastfeeding. Similarly, normal vaginal delivery was also associated with predominant breastfeeding. On the other hand, the presence of diabetes and hypertension caused decreased breastfeeding (Table 5).

4.2.2 Infant and young child feeding (IYCF) practices in children 6-11 months old:

Binary logistic regression analysis showed that the minimum acceptable diet and minimum dietary diversity in the 6-11 months old group were affected by the mother's education level when adjusted with gender and other sociodemographic variables ($p < 0.005$) (Table 6). A low education level was found to be associated with a lower level of minimum acceptable diet. But in the case of minimum meal frequency as a dependent variable, the father's occupation and monthly income seemed to affect this dependent variable (Table 6). The least income level and children of unemployed/dead/divorced fathers achieved the least levels of minimum meal frequency (Table 6).

Table 5 Binary logistic regression analysis: (0-6 months age)

Table 5: Binary logistic regression analysis: (0-6 months age)				
Independent variables:	p-value:	Odds ratio:	95% Confidence Interval for Odds ratio:	
			Lower	Upper
Model 1: DV'= Predominant breastfeeding, p<0.005 (age 0-6 months)				
Gender	0.148	-----	-----	-----
Comorbidity	0.034	10.48	1.33	82.88
Mode of delivery	0.015	5.80	1.44	23.43
Monthly income	0.275	-----	-----	-----
Mother's education	0.045	20.45	1.07	391.84
Mother's work status	0.500	-----	-----	-----
'DV= Dependent variable				

4.2.3 Infant and young child feeding (IYCF) practices in children 6-11 months old:

Binary logistic regression analysis showed that the minimum acceptable diet and minimum dietary diversity in the 6-11 months old group were affected by the mother's education level when adjusted with gender and other sociodemographic variables ($p < 0.005$) (Table 6). A low education level was found to be associated with a lower level of minimum acceptable diet. But in the case of minimum meal frequency as a dependent variable, the father's occupation and monthly income seemed to affect this dependent variable (Table 6). The least income level and children of unemployed/dead/divorced fathers achieved the least levels of minimum meal frequency (Table 6).

4.2.4 Infant and young child feeding (IYCF) practices in children 12-23 months old:

Binary logistic regression analysis showed that the model including minimum acceptable diet (MAD) as the dependent variable in the 12-23 months old group was statistically significant ($p < 0.001$) (Table 7). Although none of the independent variables could show their effect in the model, the father's occupation, monthly income, maternal education, and mother's work status had significant effects on the minimum acceptable diet when chi-square test was done on these variables individually (Fig 4). A government job of the father and a better income level was found to be related to a better level of minimum acceptable diet. A better maternal education level was also associated with a better minimum acceptable diet. Working mothers were also found to provide a better minimum acceptable diet (Fig. 4). The mother's work status was found to affect the dependent variable when the dependent variable in the model was minimum dietary diversity.

Interestingly, non-working women could not achieve minimum dietary diversity when compared with working women. When the dependent variable was minimum meal frequency, lower maternal education level was found to be related to better achievement of minimum meal frequency (Fig. 1).

Table 6: Binary logistic regression analysis: (age 6-11 months)

Table 6: Binary logistic regression analysis: (age 6-11 months)				
Independent variables:	p-value:	Odds ratio:	95% Confidence Interval for Odds ratio:	
			Lower	Upper
Model 1: DV¹= Minimum acceptable diet, p<0.005				
Gender	0.148	-----	-----	-----
Housemaid	0.88	-----	-----	-----
Father's occupation	0.305	-----	-----	-----
Monthly income	0.349	-----	-----	-----
Mother's education	0.017	0.02	0.00	0.51
Mother work status	0.207	-----	-----	-----
Model 2: DV¹= Minimum dietary diversity, p<0.005				
Gender	0.268	-----	-----	-----
Housemaid	0.794	-----	-----	-----
Father's occupation	0.223	-----	-----	-----
Monthly income	0.318	-----	-----	-----
Mother's education	0.01	0.02	0.00	0.38
Mother work status	0.851	-----	-----	-----
Model 3: DV¹= Minimum meal frequency, p<0.005				
Gender	0.223	-----	-----	-----
Housemaid	0.318	-----	-----	-----
Father's occupation	0.007	8.09	1.76	37.26
Monthly income	0.005	0.12	0.03	0.52

Mother's education	0.794	-----	-----	-----
Mother work status	0.207	-----	-----	-----
'DV= Dependent variable				

Table 7: Binary logistic regression analysis: (age 12-23 months)

Table 7: Binary logistic regression analysis: (age 12-23 months)				
Independent variables:	p-value:	Odds ratio:	95% Confidence Interval for Odds ratio:	
			Lower	Upper
Model 1: DV¹= Minimum acceptable diet, p<0.001				
Gender	0.395	-----	-----	-----
Housemaid	0.561	-----	-----	-----
Father's occupation	0.498	-----	-----	-----
Monthly income	0.703	-----	-----	-----
Mother's education	0.258	-----	-----	-----
Mother work status	0.074	-----	-----	-----
Model 2: DV¹= Minimum dietary diversity, p<0.005				
Gender	0.304	-----	-----	-----
Housemaid	0.19	-----	-----	-----
Father's occupation	0.776	-----	-----	-----
Monthly income	0.805	-----	-----	-----
Mother's education	0.345	-----	-----	-----
Mother work status	0.030	0.07	0.01	0.77
Model 3: DV¹= Minimum meal frequency, p<0.005				
Gender	0.223	-----	-----	-----
Housemaid	0.692	-----	-----	-----
Father's occupation	0.863	-----	-----	-----

Monthly income	0.345	-----	-----	-----
Mother's education	0.048	5.23	1.01	27.11
Mother work status	0.434	-----	-----	-----
'DV= Dependent variable				

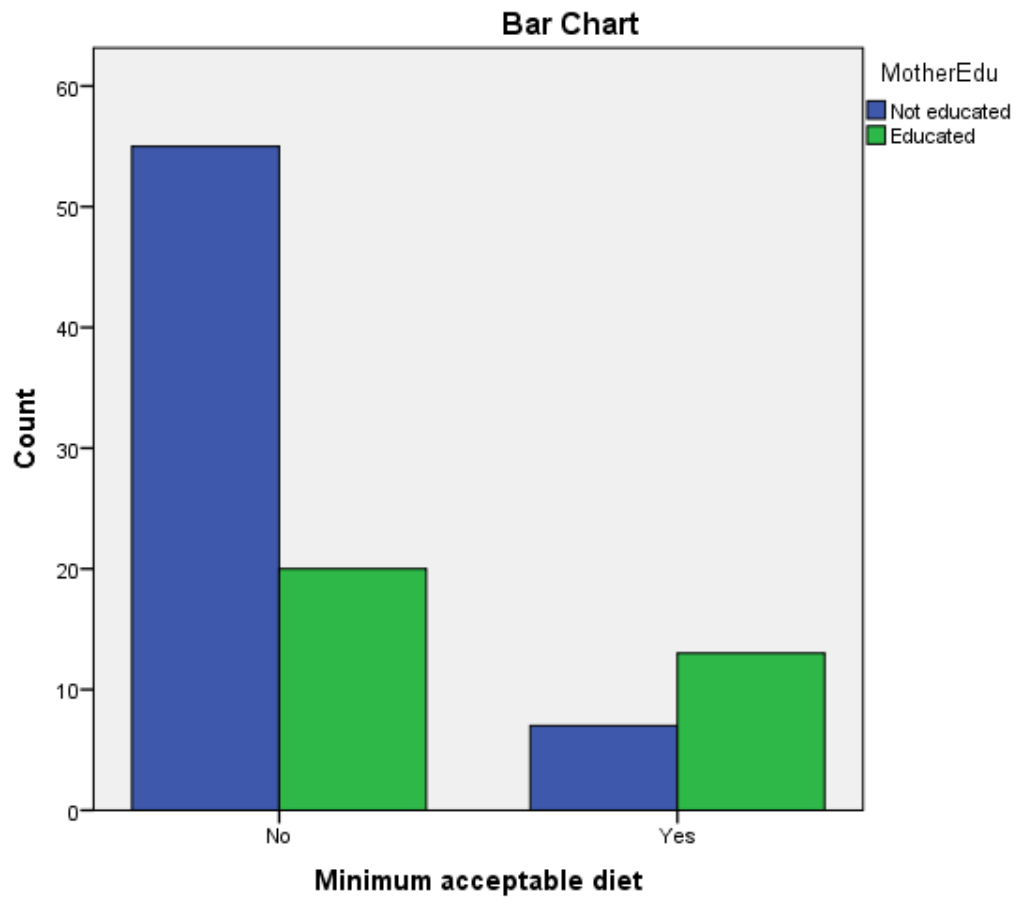


Fig 1a: Chi-square test between MAD and mother's education in group 12-23 months

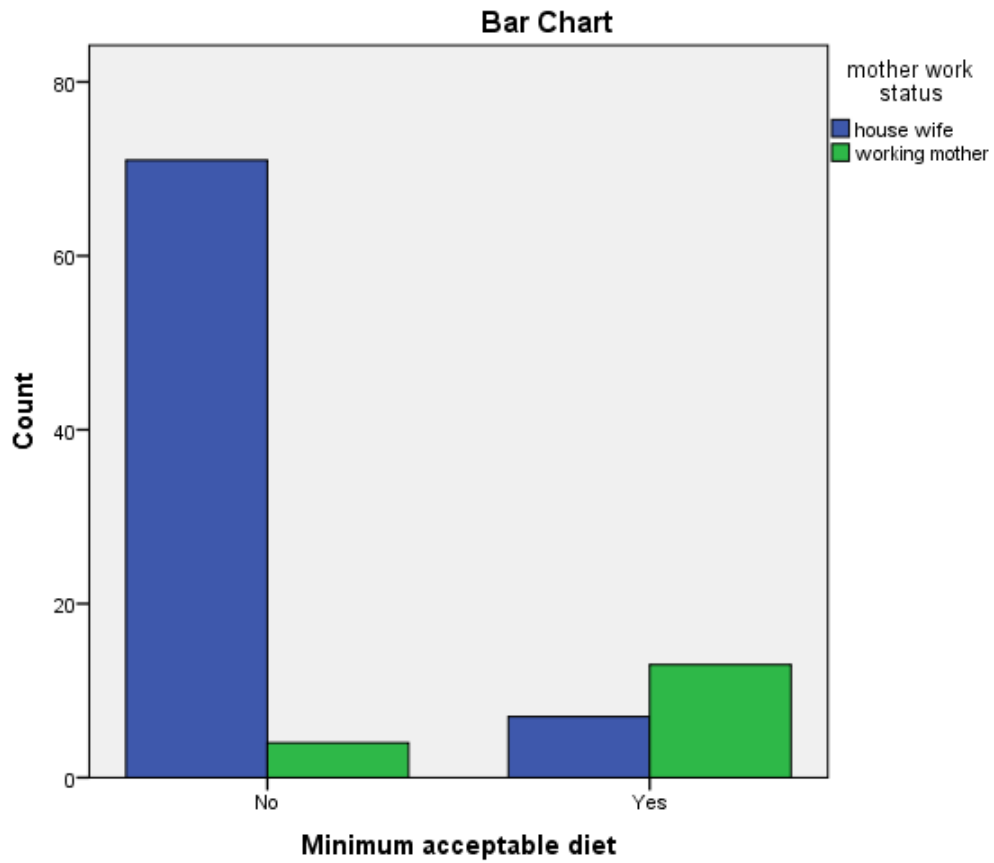


Fig 1b: Chi-square test between MAD and mother's work status in group 12-23 months:

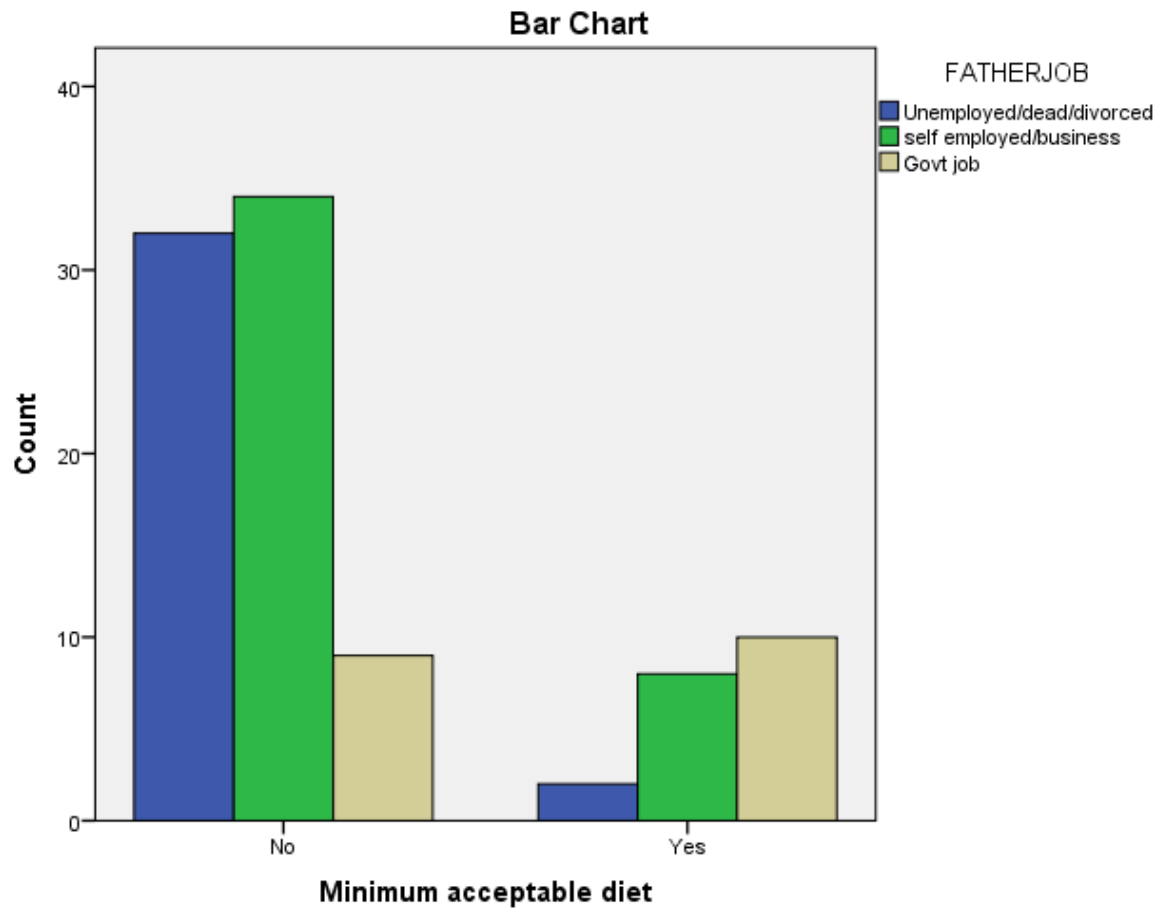


Fig 1c: Chi-square test between MAD and father's occupation in group 12-23 months:

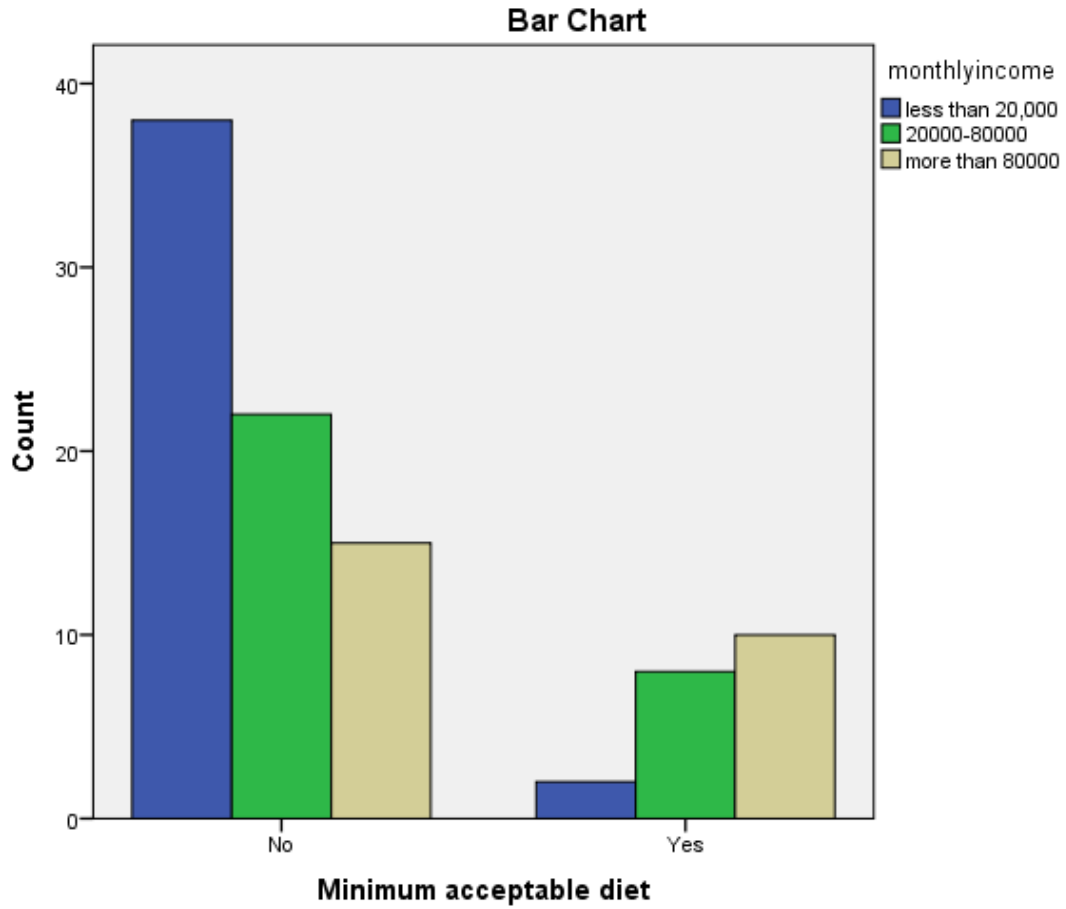


Fig 1d: Chi-square test between MAD and family's monthly income in group 12-23 months:

4.2.5 IYCF practices in children 6-11 months and 12-23 months old:

When both 6-11 months old and 12-23 months old groups were analyzed together, the father's occupation and the mother's education level seemed to affect the minimum acceptable diet when adjusted with age, gender, and other sociodemographic variables ($p < 0.001$) (Table 8). The lower education level of a mother was found to be associated with a lower level of minimum acceptable diet. A better level of minimum acceptable diet was observed in children of those fathers who were in government jobs. The father's occupation and the mother's education level seemed to affect the minimum dietary diversity in a similar way, after adjustment with age, gender, and other sociodemographic variables ($p < 0.001$). In relation to minimum meal frequency in both groups, the father's occupation, the age of the child, and the monthly income of the family seemed to affect the dependent variable. The lowest level of minimum meal frequency was observed in those children whose fathers were unemployed/dead/divorced, and in the families with an income level of less than Rs. 20,000 per month (Table 8). The age group of 12-23 months was better in relation to minimal meal frequency.

Table 8: Binary logistic regression analysis: (age 6-11 months & age 12-23 months)

Table 8: Binary logistic regression analysis: (age 6-11 months & age 12-23 months)				
Independent variables:	p-value:	Odds ratio:	95% Confidence Interval for Odds ratio:	
			Lower	Upper
Model 1: DV¹= Minimum acceptable diet, p<0.005				
Age	0.895	-----	-----	-----
Gender	0.709	-----	-----	-----
Housemaid	0.250	-----	-----	-----
Father's occupation	0.037	5.28	1.10	25.22
Monthly income	0.550	-----	-----	-----
Mother's education	0.005	0.10	0.02	0.50
Mother work status	0.139	-----	-----	-----
Model 2: DV¹= Minimum dietary diversity, p<0.005				
Age	0.557	-----	-----	-----
Gender	0.876	-----	-----	-----
Housemaid	0.291	-----	-----	-----
Father's occupation	0.025	6.05	1.26	29.10
Monthly income	0.660	-----	-----	-----
Mother's education	0.004	0.09	0.02	0.46
Mother work status	0.059	-----	-----	-----
Model 3: DV¹= Minimum meal frequency, p<0.005				
Age	0.000	0.106	0.046	0.245
Gender	0.061	-----	-----	-----

Housemaid	0.500	-----	-----	-----
Father's occupation	0.007	6.31	1.67	23.90
Monthly income	0.000	0.06	0.02	0.23
Mother's education	0.386	-----	-----	-----
Mother work status	0.998	-----	-----	-----
'DV= Dependent variable				

5 Discussion

The primary aim of the present study was to assess infant and young child feeding practices and to find out probable determinants for persistent suboptimal rates of IYCF practices in rural areas of district Quetta, Pakistan.

This study showed that the IYCF practices were not up to the mark in these areas. Additionally, only 75 % of mothers were ever able to breastfeed their babies while 25 % children were never breastfed. These rates are higher than national rates which were reported by PDHS and NNS in 2018 but still comparable.(Shahid et al., 2022).in our study about about 51% mothers initiated breast feeding within 1 -24 hr while remaining started breast feeding after one day or never able to breast fed. These finding are approximately same as reported by other national level studies (Abbas, Kumar, Mahmood, & Somrongthong, 2021) (Imtiaz, ul Haq, Sadiq, & Fazid, 2020).

Exclusive breast feeding was 51% while prevalence of using predominant breast feeding was 53% ,these findings are compatible with the results reported by national nutritional survey and other studies done in this regard (S. Ali, Ali, Imam, Ayub, & Billoo, 2011). Age appropriate breast feeding at 1 year was found to be 61 percent at 0-6months it was 53 % while at 12-23months it was lesser than the other two groups due to the fact that exclusive breast feeding is practiced in 51% of mother ,in the older cohort mainly mothers complaints of not producing enough milk to fulfill the age appropriate needs of breast feeding . these findings are comparable to few international studies in other LMIC (Pradhan, Kandapan, & Pradhan, 2021).

Our study showed that source of milk in 0-6 months of age children was predominantly breast milk, in 6-11 months and 12-23months it is formula milk which is largely used by mothers. Many studies reported high prevalence of using formula milk specifically in children 6-23months(Hirani, 2012). Despite multiple awareness program regarding the use of formula milk still its consumption among the mothers is quite high (S. Ali et al., 2011). Another finding of the present study worth mentioning that is absence of source of milk in 11.5% of whole sample . Milk is crucial and primary food at this age and absence of such vital food could

yield drastic effects on growth of children (Givens, 2020). This may explain higher stunting rates in province of Baluchistan (Achakzai & Khan, 2016).

It is worth mentioning that 40% of children 6-11 months was not being started with solid or semi solid and soft food .Remaining 60 % were using either solid semi solid or soft food these findings are comparable with findings reported by PDHS 2018 and MICS 2015(Statistics & UNICEF, 2015). The percentage of infants of the age group 6-11 months getting suggested minimum acceptable diet (15%) minimum dietary diversity (16%), minimum meal frequency (35%) was much lesser in this study setting. A multi-national study carried out in different countries of south Asia, including Pakistan, stated infants of age 6–23 months got the MDD that varied from 15%-71% in India to Sri Lanka (Senarath et al., 2012). Yet, the percentage of children having recommended minimum MDD and MAD in the present study was comparable with findings of NNS 2018 but lower than other provinces. This discrepancy may be linked to the poverty availability and accessibility to specific foods such as wheat, rice, eggs and meat or the cultural dependency on eating items that are poor on important nutrients(Studies, Demographic, & Surveys, 2012).

In the cohort of children 11-23 months of age more than 70% of these children fulfilled the criteria of minimum meal frequency, only about 20% of the children fulfilled the criteria of minimum dietary diversity, and about 20% of the infants fulfilled the criteria for minimum acceptable diet (Table 4). The study showed that children with age group of 11–23 months had higher percentage of getting the minimum meal frequency in as compared to infants age group amongst 6-11months. These findings are supported by other studies carried out in different countries like Srilanka, India and Ethiopia (Aemro, Mesele, Birhanu, & Atenafu, 2013).The reason might be attributed to, that infants in the age bracket of 6-11 months were not begin with semisolid food , mothers did not initiated soft or solid food; they are breast fed, animal fed or fed on formula.

The infants in the age bracket of 11-23 have higher percentage of fulfilling the criteria of minimum dietary diversity as compared to the age group 6-11 months this finding in consistent with the studies carried out at national and international level (Joshi, Agho, Dibley, Senarath, & Tiwari, 2012; Senarath et al., 2012). The reason might be different in different context for

example mothers may have perception that younger children, have poor ability to digest semisolid and soft foods. In addition mothers may presume initiating a variety of a food at once would cause infections (Chilinda, Wahlqvist, Lee, & Huang, 2021).

World Health Organization recommends that a child from 6-23 months age must consume food from at least four food groups, including at least one food from animal source, along with other staple foods(Kumar, Rajpal, Alambusha, Sharma, & Joe, 2022) . Only 3% children from 6-11 months age and 15% children from 12-23 months age were found to consume meat (from any source), and about 20% children from 6-11 months age and 30% children from 12-23 months age consumed eggs in rural Pakistan(M. Ali, Arif, & Shah, 2021) . According to our study, about 31% children from 6-11 months age were consuming eggs and/or meat and about 47% children from 12-23 months age were consuming eggs and/or meat, which seemed to be consistent with our findings from Pakistan Demographic and Health Survey (2017–18).

WHO recommends that children from 6-23 months must consume at least one fruit or vegetable, along with breastfeed (Kumar et al., 2022). In a study done on household surveys in India, more than 80% children between 6-23 months age were consuming vegetables, out of which less than 7% were vitamin A rich vegetables(Kumar et al., 2022) . Fruits and vegetables were rarely consumed in South African children of 6-23 months age (Chakona, 2020), and none of the children were found to eat fruits and vegetables in an Ethiopian study(Biks, Tariku, Wassie, & Derso, 2018) . A Pakistani study, done on middle class, showed that only 10% of children in 6-11 months age, and only 4% in 12-23 months age consumed vegetables and fruits(Asghar, Fahim, & Lifschitz, 2022). Pakistan Demographic and Health Survey (2017–18) survey showed that vitamin A rich fruits and vegetables consumption was only 8.6 %, and other fruits and vegetables consumption was only about 15% in children 6-11 months age, and about 24%, and 31.5%, respectively, in 12-23 months old children, in rural Pakistan(M. Ali et al., 2021) . Results from Pakistan Demographic and Health Survey (2017–18) survey showed that fruits and vegetable consumption increased from the age group of 6–11 months to 12–23 months (M. Ali et al., 2021). Our present study results were consistent with this finding. Our results showed that vegetable consumption was only 17.6%, and fruit consumption was only 12% in 6-11 months old group, which increased to consumption of vegetables to about 38% and of fruit to about 17% in 12-23 months old group.

In literature, mother's education level was significantly associated with EBF and MDD (Demie, Gesese, Derseh, Mruts, & Gebremariam, 2021). It was found that the odds of a better MDD in illiterate mothers were less compared to mothers with formal education. The reasons might be that educated mothers were more likely to have more information and knowledge, and could get better paid jobs. This could increase the purchasing power of the family (Demie et al., 2021). Adverse effects of maternal employment probably arise in the absence of adequate family support for low-income working mothers (Win, 2022). Our study also found significant effects of mother's education level on breastfeeding as well as MDD, MMF, and MAD. Mothers, who were non-working, had better odds of breastfeeding their children (Agarwal, Sinha, & Katyal, 2021). However, no such relationship could be found in our study. Maternal employment was found to be associated with an increase in child stunting in the slum areas (Win et al., 2022). Adverse effects of maternal employment probably arise in the absence of adequate family support for low-income working mothers. But literature (Win et al., 2022) also showed that children whose mothers were working had better odds for MDD than those children whose mothers were non-working. This could be because employed mothers were more likely to have better in (Demie et al., 2021; Oddo & Ickes, 2018). Our study also found beneficial effect of doing job on MDD.

Father's occupation seemed to be an important factor in increasing dietary diversity (Bedada Damtie, Benti Tefera, & Tegegne Haile, 2020). Those fathers, who were employed, as government employees or were businessmen were able to provide better dietary diversity as compared to those who worked on daily wages, or who were unemployed. Our study was also consistent with these findings.

5.1 Strengths:

The strengths of this study include the wide range of socio-economic and study-related variables, and the use of standardized survey methods. Moreover, the current study is successful in assessing the awareness and barriers to IYCF practices. Current study is unique in this regard that it was done in rural areas of Baluchistan where no such study has been done previously. The findings of the current study can be generalized to populations from other rural parts of Pakistan.

5.2 Limitations:

As the current study was a cross-sectional one, it could limit the establishment of causality.

5.3 Conclusion:

This study concluded with the impression that breastfeeding practices were poor in this population and most of the respondents had poor awareness about infant and young child feeding practices. Minimum meal frequency, minimum dietary diversity, and minimum acceptable diet were low in majority of the cases. Furthermore mother education, mother work status, monthly income, father occupation, mode of delivery and mothers comorbidities are the determinant of IYCF in this population.

5.4 Recommendations:

- Government should encourage policies at local, national and international levels to support infant and young child feeding practices.
- Policies should be developed and implemented that focuses on influencing and supporting mothers for breastfeeding and IYCF practices.
- Strategic use of mass media can be employed in creating awareness about breastfeeding and IYCF practices.
- Coordinated approaches are needed in non-health sectors of government such as education, urban planning, and agriculture to support families for breastfeeding and IYCF practices.

6 References:

- Abbas, F., Kumar, R., Mahmood, T., & Somrongsong, R. (2021). Impact of children born with low birth weight on stunting and wasting in Sindh province of Pakistan: a propensity score matching approach. *Scientific reports*, *11*(1), 1-10.
- Achakzai, P., & Khan, R. (2016). Nutritional status and associated factors among children less than five years of age in tehsil Zarghoon town, District Quetta, Baluchistan. *Journal of Ayub Medical College Abbottabad*, *28*(1), 146-151.
- Adepoju, A. A., & Allen, S. (2019). Malnutrition in developing countries: Nutrition disorders, a leading cause of ill health in the world today. *Paediatrics and Child Health*, *29*(9), 394–400. <https://doi.org/10.1016/j.paed.2019.06.005>
- Aemro, M., Mesele, M., Birhanu, Z., & Atenafu, A. (2013). Dietary diversity and meal frequency practices among infant and young children aged 6–23 months in Ethiopia: a secondary analysis of Ethiopian demographic and health survey 2011. *Journal of nutrition and metabolism*, 2013.
- Agarwal, M., Sinha, A., & Katyal, R. (2021). An Epidemiological-Association of Infant and Young Child Feeding Practices In Rural Area of Bareilly District: A Cross Sectional Study. *National Journal of Community Medicine*, *12*(03), 57-61.
- Ahmad, D., Afzal, M., & Imtiaz, A. (2020). Effect of socioeconomic factors on malnutrition among children in Pakistan. *Future Business Journal*, *6*(1), 30. <https://doi.org/10.1186/s43093-020-00032-x>
- Akber, S, Mahmood, H, Fatima, R, Wali, A, Alam, A, Sheraz, SY, Yaqoob, A, Najmi, H, Abbasi, S, Mahmood, H, Dibley, MJ, & Hazir, T. (2020). Effectiveness of a mobile health intervention on infant and young child feeding among children ≤ 24 months of age in rural Islamabad over six months duration. *F1000Research*.
- Ali, M., Arif, M., & Shah, A. A. (2021). Complementary feeding practices and associated factors among children aged 6–23 months in Pakistan. *PLOS ONE*, *16*(2), e0247602. <https://doi.org/10.1371/journal.pone.0247602>
- Ali, M., Arif, M., & Shah, A. A. (2021). Complementary feeding practices and associated factors among children aged 6–23 months in Pakistan. *PloS one*, *16*(2), e0247602.
- Ali, S., Ali, S. F., Imam, A. M., Ayub, S., & Billoo, A. G. (2011). Perception and practices of breastfeeding of infants 0-6 months in an urban and a semi-urban community in Pakistan: a cross-sectional study. *Journal of the Pakistan Medical Association*, *61*(1), 99.

- Amjad, M., & Akbar, M. (2020). Role of Socioeconomic Factors to overcome Micronutrient Malnutrition in Pakistan: Application of Partial Proportional Odds Model. *Progress in Nutrition*, 22(3), e2020021. <https://doi.org/10.23751/pn.v22i3.8404>
- Ariff, S., Saddiq, K., Khalid, J., Sikanderali, L., Tariq, B., Shaheen, F., Nawaz, G., Habib, A., & Soofi, S. B. (2020). Determinants of infant and young complementary feeding practices among children 6–23 months of age in urban Pakistan: A multicenter longitudinal study. *BMC Nutrition*, 6(1), 75. <https://doi.org/10.1186/s40795-020-00401-3>
- Arikpo D, Edet ES, Chibuzor MT, Odey F, & Caldwell DM. (2018). *Educational interventions for improving primary caregiver complementary feeding practices for children aged 24 months and under (Review)*.
- Asghar, R. M., Fahim, H., & Lifschitz, C. (2022). Lack of adherence to complementary feeding in middle socioeconomic status Pakistani infants and young children. *World Nutrition*, 13(2), 24-33.
- Asim, M., & Nawaz, Y. (2018). Child Malnutrition in Pakistan: Evidence from Literature. *Children*, 5(5), 60. <https://doi.org/10.3390/children5050060>
- Bedada Damtie, S., Benti Tefera, T., & Tegegne Haile, M. (2020). Dietary diversity practice and associated factors among children aged 6–23 months in Robe town, Bale zone, Ethiopia. *Journal of nutrition and metabolism*, 2020.
- Berger, P. K., Plows, J. F., Demerath, E. W., & Fields, D. A. (2020). Carbohydrate composition in breast milk and its effect on infant health. *Current Opinion in Clinical Nutrition & Metabolic Care*, 23(4), 277–281. <https://doi.org/10.1097/MCO.0000000000000658>
- Biks, G. A., Tariku, A., Wassie, M. M., & Derso, T. (2018). Mother’s Infant and Young Child Feeding (IYCF) knowledge improved timely initiation of complementary feeding of children aged 6–24 months in the rural population of northwest Ethiopia. *BMC research notes*, 11(1), 1-7.
- Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., Mathers, C., & Rivera, J. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet*, 371(9608), 243–260. [https://doi.org/10.1016/S0140-6736\(07\)61690-0](https://doi.org/10.1016/S0140-6736(07)61690-0)
- Chakona, G. (2020). Social circumstances and cultural beliefs influence maternal nutrition, breastfeeding and child feeding practices in South Africa. *Nutrition Journal*, 19(1), 1-15.
- Chilinda, Z. B., Wahlqvist, M. L., Lee, M.-S., & Huang, Y.-C. (2021). Optimal household water access fosters the attainment of minimum dietary diversity among children aged 6–23 months in Malawi. *Nutrients*, 13(1), 178.

- De, P., & Chattopadhyay, N. (2019). Effects of malnutrition on child development: Evidence from a backward district of India. *Clinical Epidemiology and Global Health*, 7(3), 439–445. <https://doi.org/10.1016/j.cegh.2019.01.014>
- Demie, T. G., Gesese, G. T., Derseh, B. T., Mruts, K. B., & Gebremariam, T. B. (2021). Factors Associated With Minimum Dietary Diversity Among Children Aged 6 to 23 Months in Debre Berhan Town, Central Ethiopia: Community-based Cross-sectional Study.
- Demilew, Y. M., Tafere, T. E., & Abitew, D. B. (2017). Infant and young child feeding practice among mothers with 0–24 months old children in Slum areas of Bahir Dar City, Ethiopia. *International Breastfeeding Journal*, 12(1), 26. <https://doi.org/10.1186/s13006-017-0117-x>
- Dhami, M., Ogbo, F., Akombi-Inyang, B., Torome, R., Agho, K., & on behalf of the Global Maternal and Child Health Research Collaboration (GloMACH). (2021). Understanding the Enablers and Barriers to Appropriate Infants and Young Child Feeding Practices in India: A Systematic Review. *Nutrients*, 13(3), 825. <https://doi.org/10.3390/nu13030825>
- Ersino, G., Zello, G. A., Henry, C. J., & Regassa, N. (2018). Gender and household structure factors associated with maternal and child undernutrition in rural communities in Ethiopia. *PLOS ONE*, 13(10), e0203914. <https://doi.org/10.1371/journal.pone.0203914>
- Gausman, J., Kim, R., Li, Z., Tu, L., Rajpal, S., Joe, W., & Subramanian, S. V. (2022). Comparison of Child Undernutrition Anthropometric Indicators Across 56 Low- and Middle-Income Countries. *JAMA Network Open*, 5(3), e221223. <https://doi.org/10.1001/jamanetworkopen.2022.1223>
- George, A. S., Amin, A., de Abreu Lopes, C. M., & Ravindran, T. K. S. (2020). Structural determinants of gender inequality: Why they matter for adolescent girls' sexual and reproductive health. *BMJ*, 16985. <https://doi.org/10.1136/bmj.16985>
- Gillani, S., Shafiq, M. N., Bhatti, M. A., & Ahmad, T. I. (2022). Impact of Economic Growth on Child Malnutrition in Pakistan: A Time Series Analysis. *IRASD Journal of Economics*, 4(1), 149–163. <https://doi.org/10.52131/joe.2022.0401.0069>
- Givens, D. (2020). MILK Symposium review: The importance of milk and dairy foods in the diets of infants, adolescents, pregnant women, adults, and the elderly. *Journal of dairy science*, 103(11), 9681-9699.
- Hirani, S. A. A. (2012). Malnutrition in young Pakistani children. *Journal of Ayub Medical College*, 24(2), 150.
- Imtiaz, A., ul Haq, Z., Sadiq, N., & Fazid, S. (2020). Early initiation of breast feeding among children 0-23 months of age and associated factors in district Charsadda, Pakistan. *Khyber medical university journal*, 12(2), 95-101.

- Joshi, N., Agho, K. E., Dibley, M. J., Senarath, U., & Tiwari, K. (2012). Determinants of inappropriate complementary feeding practices in young children in Nepal: secondary data analysis of Demographic and Health Survey 2006. *Maternal & child nutrition*, 8, 45-59.
- Karmee, N., Satapathy, S. P., & Tripathy, R. M. (2017). Infant and young child feeding practices among mothers attending an Urban Health Training Centre (UHTC): A cross-sectional (mixed methodology) study in Berhampur, South Odisha, India. *International Journal of Contemporary Pediatrics*, 5(1), 161. <https://doi.org/10.18203/2349-3291.ijcp20175579>
- Khaliq, A., Wraith, D., Miller, Y., & Nambiar-Mann, S. (2021). Prevalence, Trends, and Socioeconomic Determinants of Coexisting Forms of Malnutrition Amongst Children under Five Years of Age in Pakistan. *Nutrients*, 13(12), 4566. <https://doi.org/10.3390/nu13124566>
- Khan, I. H. (2020). *Comparative Analysis of Determinants of Infant Mortality across Punjab, Pakistan*. 8, 18.
- Krishna, A., Mejía-Guevara, I., McGovern, M., Aguayo, V. M., & Subramanian, S. V. (2018). Trends in inequalities in child stunting in South Asia. *Maternal & Child Nutrition*, 14(S4). <https://doi.org/10.1111/mcn.12517>
- Kumar, A., Rajpal, S., Alambusha, R., Sharma, S., & Joe, W. (2022). Can Anganwadi services strengthening improve the association between maternal and child dietary diversity? Evidence from Project Spotlight implemented in tribal dominated Gadchiroli and Chandrapur districts of Maharashtra, India. *PloS one*, 17(3), e0264567.
- Manikam, L., Sharmila, A., Dharmaratnam, A., Alexander, E. C., Kuah, J. Y., Prasad, A., Ahmed, S., Lingam, R., & Lakhampaul, M. (2018). Systematic review of infant and young child complementary feeding practices in South Asian families: The Pakistan perspective. *Public Health Nutrition*, 21(4), 655–668. <https://doi.org/10.1017/S1368980017002956>
- Nasir, Ategbro, EA, Shuja, S, Khan, W, & Rehman, S. (2020). *Using an in-depth assessment of young children's diets to develop a multisectoral nutrition communications strategy in Punjab province, Pakistan*. 2.
- Noor Shahid, Faiza Salman, Mahnaz Makhdam, & Admin. (2020). Major factors responsible for child malnutrition: A review. *Journal of the Pakistan Medical Association*, 1–13. <https://doi.org/10.47391/JPMA.1243>
- Nurokhmah, S., Rahmawaty, S., & Puspitasari, D. I. (2022). Determinants of Optimal Breastfeeding Practices in Indonesia: Findings From the 2017 Indonesia Demographic Health Survey. *Journal of Preventive Medicine and Public Health*, 55(2), 182–192. <https://doi.org/10.3961/jpmp.21.448>

- Oddo, V. M., & Ickes, S. B. (2018). Maternal employment in low-and middle-income countries is associated with improved infant and young child feeding. *The American journal of clinical nutrition*, *107*(3), 335-344.
- Pang, W. W., Tan, P. T., Cai, S., Fok, D., Chua, M. C., Lim, S. B., Shek, L. P., Chan, S.-Y., Tan, K. H., Yap, F., Gluckman, P. D., Godfrey, K. M., Meaney, M. J., Broekman, B. F. P., Kramer, M. S., Chong, Y.-S., & Rifkin-Graboi, A. (2020). Nutrients or nursing? Understanding how breast milk feeding affects child cognition. *European Journal of Nutrition*, *59*(2), 609–619. <https://doi.org/10.1007/s00394-019-01929-2>
- Pourhoseingholi, M. A., Vahedi, M., & Rahimzadeh, M. (2013). *Sample size calculation in medical studies*. 4.
- Pradhan, I., Kandapan, B., & Pradhan, J. (2021). Age-appropriate feeding practices and their association with undernutrition among children aged 6–23 months in aspirational districts of India: a multinomial analysis. *Journal of Biosocial Science*, 1-21.
- Ryckman, T., Beal, T., Nordhagen, S., Murira, Z., & Torlesse, H. (2021). Affordability of nutritious foods for complementary feeding in South Asia. *Nutrition Reviews*, *79*(Supplement_1), 52–68. <https://doi.org/10.1093/nutrit/nuaa139>
- Saleem, J., Zakar, R., Bukhari, G. M. J., Fatima, A., & Fischer, F. (2021). Developmental delay and its predictors among children under five years of age with uncomplicated severe acute malnutrition: A cross-sectional study in rural Pakistan. *BMC Public Health*, *21*(1), 1397. <https://doi.org/10.1186/s12889-021-11445-w>
- Senarath, U., Agho, K. E., Akram, D. e. S., Godakandage, S. S., Hazir, T., Jayawickrama, H., . . . Patel, A. (2012). Comparisons of complementary feeding indicators and associated factors in children aged 6–23 months across five South Asian countries. *Maternal & child nutrition*, *8*, 89-106.
- Shahid, M., Cao, Y., Shahzad, M., Saheed, R., Rauf, U., Qureshi, M. G., . . . Ahmed, F. (2022). Socio-economic and environmental determinants of malnutrition in under three children: evidence from PDHS-2018. *Children*, *9*(3), 361.
- Shuja, S., Khan, W., Mahmood, H., Kiani, H., Sheraz, S. Y., & Ategbo, E. A. (2022). *Enablers and Barriers to Adequate Complementary Feeding (CF) Practices in Pakistan; Secondary Analysis of Formative Research on National CF Assessment (NCF A)* [Preprint]. In Review. <https://doi.org/10.21203/rs.3.rs-1641541/v2>
- Statistics, S. B. o., & UNICEF. (2015). Sindh multiple indicator cluster survey 2014, final report: Sindh Bureau of Statistics and UNICEF Karachi, Pakistan.
- Studies, N. I. o. P., Demographic, M. I. I. f. R. D., & Surveys, H. (2012). *Pakistan demographic and health survey*: National Institute of Population Studies.

- Taha, Z., Garemo, M., & Nanda, J. (2020). Complementary feeding practices among infants and young children in Abu Dhabi, United Arab Emirates. *BMC Public Health*, 20(1), 1308. <https://doi.org/10.1186/s12889-020-09393-y>
- Tariqujjaman, Md., Hasan, Md. M., Mahfuz, M., Ahmed, T., & Hossain, M. (2022). Between and Within-Country Variations in Infant and Young Child Feeding Practices in South Asia. *International Journal of Environmental Research and Public Health*, 19(7), 4350. <https://doi.org/10.3390/ijerph19074350>
- Torlesse, H., Murira, Z., & Hoogendoorn, A. (2022). Complementary feeding in South Asia: A multi-system analysis of the enabling environment and programme context. *Journal of Public Health*, 30(8), 1935–1947. <https://doi.org/10.1007/s10389-022-01709-z>
- Victora, C. G., Christian, P., Vdaletti, L. P., Gatica-Domínguez, G., Menon, P., & Black, R. E. (2021). Revisiting maternal and child undernutrition in low-income and middle-income countries: Variable progress towards an unfinished agenda. *The Lancet*, 397(10282), 1388–1399. [https://doi.org/10.1016/S0140-6736\(21\)00394-9](https://doi.org/10.1016/S0140-6736(21)00394-9)
- Wells, J. C. K., Briend, A., Boyd, E. M., Berkely, J. A., Hall, A., Isanaka, S., Webb, P., Khara, T., & Dolan, C. (2019). Beyond wasted and stunted—A major shift to fight child undernutrition. *The Lancet Child & Adolescent Health*, 3(11), 831–834. [https://doi.org/10.1016/S2352-4642\(19\)30244-5](https://doi.org/10.1016/S2352-4642(19)30244-5)
- WHO & UNICEF. (2021). *Indicators for assessing infant and young child feeding practices, Definitions and measurement methods*.
- Win, H., Shafique, S., Mizan, S., Wallenborn, J., Probst-Hensch, N., & Fink, G. (2022). Association between mother's work status and child stunting in urban slums: a cross-sectional assessment of 346 child-mother dyads in Dhaka, Bangladesh (2020). *Archives of Public Health*, 80(1), 1-16.
- World Health Assembly. (2001). *Infant and young child nutrition*. FIFTY-FOURTH WORLD HEALTH ASSEMBLY.
- World Health Organization & UNICEF. (2008). *Strengthening action to improve feeding of infants and young children 6-23 months of age in nutrition and child health programmes: Report of proceedings, Geneva, 6-9 October 2008*. <https://apps.who.int/iris/handle/10665/44034>
- World Health Organization. (2000). *Complementary Feeding Family foods for breastfed children*.

ANNEXURE: A

QUESTIONNAIRE

Infant and young child feeding practices among the mothers of 0-23 months children in rural areas of Quetta.

Part 1: Socio demographic data.

- i) id
- ii) Age
 - i. 0-6 months
 - ii. 6-12 months
 - iii. 12-23 months
- iii) Sex
 - i. Male
 - ii. Female
- iv) Address
- v) Co morbid of mother
 - i. Hypertension
 - ii. Diabetes
 - iii. other
- vi) House help from maids or family member.
 - i. Yes
 - ii. No
- vii) Family system
 - i. Joint family
 - ii. Nuclear family
 - iii. Single parent
- viii) Mode of delivery
 - i. SVD
 - ii. C.Section

ix) father occupation.

- i. Govt servant
- ii. own business/farmer
- iii. daily wages/unemployed

x) Mother education.

- i. no education
- ii. primary
- iii. secondary
- iv. bachelor/higher

xi) Mother work status

- i. house wife
- ii. working mother

xii) Monthly income.

- i. less than 20000
- ii. 20000-80000
- iii. more than 80000

xiii) No. of siblings

- i. less than two
- ii. 2-3
- iii. 3-5
- iv. More than 5

Part 2: Infant and young child feeding practices

1	Has [NAME] ever been breastfed?	1 = Yes 2 = No 3 = Do not know
2	If the child has been breastfed in the past or is currently breastfed, how soon after birth was the baby first placed on the breast?	1= Less than one hour 2= 1-24 hours 3= after one day 4= never breastfed (Choose one option)
3	If yes for how long?	1=less than 15 min 2=15-30 min 3=more than 30min
4	Is the child currently breastfed?	1 = Yes 2 = No (Choose one option)
5	How many times yesterday during the day and night was (0-5mo)breastfed ?	<input type="text"/> times
6	What did [NAME] consume in the household in the last 24 hours? (0-5 mo)	Select all that apply 1= Breast milk only 2= Breast milk and other foods or fluids 3= Bottled or milk in cup (cow or formula) 4= Other foods only

		5= Other liquids only
7	What is source of milk?	1)cow milk 2)formula 3)other
8	Did [NAME] eat any solid, semi-solid or soft food yesterday during the day or at night	1=yes 2=no
9	If “yes” probe: What kind of solid, semi-solid or soft foods.	1=solid 2=semi solid 3=soft food
10	How many times did [NAME] eat solid, semi-solid or soft foods during the previous day?	_ times
11	What foods were given to the child yesterday during the day and night?	1. grains, roots and tubers eg wheat, rice ,roti.makai.potatoes,sweet potatoes 2. legumes and nuts e.g. moong, masoor, peanuts, walnuts 3. dairy products (milk, yogurt, cheese) — 4. flesh foods (meat, fish, poultry and liver/organ meats) — eggs — 5. fruits 6. vegetables
12	Minimum milk feeding frequency for non-breast fed child . Did your child consume 2 or more than 2 milk feed during previous day	1=yes 2=no 3=don't know
13a	Minimum acceptable diet	0 not applicable 2 no 1yes

13b	Minimum dietary diversity	0 not applicable 2 no	1yes
13c	Minimum meal frequency	0 not applicable 2 no	1yes
14	Did your child use any eggs or any other flesh food during the previous day.	1. Yes 2. No 3. Don't know	
15	If yes what was the frequency	1. 1-2 times 2. 2-3 times 3. More than 3 times	
16	Did your child(6-23m) use any Unhealthy food e.g packet juice ,Kurkure,chocolate toffee,slanty or any other during the previous day.	1. Yes 2. No 3. Don't know	
17	If yes what was the frequency	1. 1-2 2. 2-3 3. more than 3 times	
18	Did your child (6-23mo) use any vegetable during previous day.	1. Yes 2. No 3. Don't know	
19	If yes what was the frequency?	1. 1-2 2. 2-3 times 3. 3more than 3	
20	Did your child use any fruit during the previous ?	1. Yes 2. No 3. Don't know	
21	If yes what was the frequency	1. 1-2 2. 2-3 times 3. more than 3	
22	Did your child use any legumes like daal,chick peas.peas during previous day ?	a. Yes b. No c. Don't know	

23	If yes what was the frequency.	<ul style="list-style-type: none"> a. 1-2 b. 2-3 times c. more than 3
24	Did your child use any cereals like wheat, rice, roti, chapathi, noodles, Makai?	<ul style="list-style-type: none"> 1. Yes 2. No 3. Don't know
25	If yes what was the frequency	<ul style="list-style-type: none"> 1. 1-2 2. 2-3 3. more than 3 times
26	Did your child (6-23 mo) feed from bottle during the last day.	<ul style="list-style-type: none"> 1. Yes 2. No 3. Don't know
27	If yes how many times	<ul style="list-style-type: none"> 4. 1-2 5. 2-3 6. more than 3 times

ANNEXURE: B

consent Form

میں، ڈاکٹر گلالٹی رحمان ایم ایس پی ایچ کی طالبہ - فائنل سمسٹر، الشفاء سکول آف پبلک ہیلتھ، الشفاء آئی ہسپتال، راولپنڈی۔ میں نوزائیدہ اور چھوٹے بچوں کو کھانا کھلانے کے طریقوں پر تحقیق کر رہا ہوں۔

تحقیق کا مقصد

اس مطالعے کا مقصد کوئٹہ کے دیہی علاقوں میں 0-23 ماہ کی عمر کے بچوں کی ماؤں کے درمیان شیر خوار اور چھوٹے بچوں کو دودھ پلانے کے طریقوں کا جائزہ لینا ہے۔

شرکت

مجھے اندازہ نہیں ہے کہ اس مطالعہ کو لینے سے آپ کو کوئی خطرہ یا تکلیف ہو گی۔ آپ کی شرکت سختی سے رضاکارانہ ہے اور آپ کسی بھی وقت بغیر جرمانے کے اپنی شرکت واپس لے سکتے ہیں۔ میں آپ سے درخواست کرتا ہوں کہ جتنا ہو سکے ایمانداری سے سوالات کا جواب دیں۔ سوالنامہ مکمل کرنے میں 20 منٹ سے زیادہ وقت نہیں لگے گا۔ جمع کی گئی تمام معلومات صرف میری تحقیق کے لیے استعمال کی جائیں گی اور اسے انتہائی خفیہ رکھا جائے گا۔ آپ کی شناخت اور آپ کے جوابات قابل شناخت نہیں ہوں گے۔ تمام ڈیٹا کو گمنام طور پر محفوظ کیا جائے گا۔ چونکہ یہ مکمل طور پر طلباء کا منصوبہ ہے کوئی ترغیب نہیں دی جائے گی۔ مطالعہ مکمل ہونے کے بعد، اگر آپ چاہیں تو مجھے آپ کے ساتھ نتائج کا اشتراک کرنے میں خوشی

ہوگی۔ اس مطالعہ میں حصہ لینے پر رضامندی کا
شکریم۔ آپ کی رائے اہم ہے۔

میں نے معلوماتی پرچہ پڑھ اور سمجھ لیا ہے اور
میں نے مطالعہ میں حصہ لینے سے اتفاق کیا ہے۔

دستخط

تاریخ: _____

ANNEXURE: C

IRB Letter



**AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI**

Doc. No: 10/11/2019/10/19
10/11/2019/10/19

TO WHOM IT MAY CONCERN

This is to certify that Gulalai Rehman (U/O Abdul Rahman) is (student) Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PhD, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic which has already been approved by the Institutional Review Board (IRB) is "Infant & Young child feeding practices among the mothers of children aged 0-23 months in rural area of Quetta".

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,


Dr. Fayyaz Ullah (Faculty)
Head
School of Public Health, PhD
Al-Shifa Trust, Rawalpindi

AL-SHIFA TRUST (PVT) LTD. (INCORPORATED IN PAKISTAN)
10, NORTH SURROUNDING, 14C-10/2-RAWALPINDI
Tel: 031-3500000, 3500001 Fax: 031-3500002
E-mail: info@alshifa.edu.pk, www.alshifa.edu.pk

ANNEXURE: D

GANTT CHART

ACTIVITIES	March	April	May	June	July	Aug	Sep
LITERATURE REVIEW							
Synopsis writing and IRB approval							
Pilot testing							
DATA COLLECTION AND ENTRY							
DATA ANALYSIS							
WRITE UP							
THESIS SUBMISSION							

ANNEXURE: E

Budget

BUDGET ITEMS	STATIONARY	TRANSPORT	PRINTING	INTERNET
PILOT TESTING	4500/-	1500/-	2000/-	1500/-
DATA COLLECTION	10000/-	7000/-	8000/-	2000/-
THESIS WRITE UP	2000/-	1000/-	9500/-	2000/-
TOTAL EXPENDITURE	17500/-	9500/-	19500	5500
GRAND TOTAL	5200/-			