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Experiences of indigenous women with maternal nutrition in climate change (Cold weather) in rural Bajaur, Khyber Pakhtunkhwa, Pakistan: Implications for maternal-infant health

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EXPERIENCES OF INDIGENOUS WOMEN WITH MATERNAL NUTRITION IN CLIMATE CHANGE (COLD WEATHER) IN RURAL BAJAUR, KHYBER PAKHTUNKHWA, PAKISTAN

IMPLICATIONS FOR MATERNAL-INFANT HEALTH

By

IHSAN ULLAH

A thesis submitted in partial fulfillment
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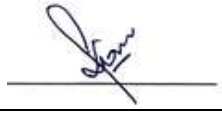

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Dedication

I dedicate this thesis to my parents, my brothers, Farman Ullah, Usman Khan, Mehran Khan, my sisters, and my nephew, Izhar Uddin. Their constant support, love, encouragement, and unwavering trust played a central role in achieving this milestone in my life. Their infinite love and patience throughout this journey empowered me to pursue higher studies and realize my dreams. Their endless prayers and affection were invaluable during my thesis journey.

I also extend my dedication to my dearest friend, Jalal Khan, who stood by me at every step of this journey. Without the support and love of these wonderful individuals, I would not have been able to accomplish this great achievement.

ABSTRACT

Background

Pakistan is one of the countries that is most susceptible to the effects of climate change. The country's Northern regions have experienced several extreme cold weather events, including floods, heavy snowfall, and heavy rains, in recent years, significantly impacting maternal and infant health. Indigenous child-bearing age women in the northern rural areas are the most vulnerable populations experiencing food insecurity, disruptive food systems, increasing food prices, and disrupting food production due to climate change exacerbation.

Aim of the study

The study aimed to explore the experiences of indigenous women with maternal nutrition in harsh winter caused by climate change in rural Bajaur, Pakistan.

Methodology

An exploratory descriptive qualitative (EDQ) design was used in the study. The study was conducted in the Public Rural Center Health of Pashat, Bajaur. A total of 12 study participants were included in the study, through the purposive sampling technique. Data was collected through an in-depth semi-structured interview guide. The collected data was analyzed manually through Content analysis approaches.

Results

The findings revealed four major themes: (i) Impact of climate change on food security and navigating strategies ii) Climatic impact on maternal health, pregnancy outcomes, and infant well-being iii) Effect of climate change on household food expenditures iv) Dietary patterns and

their significance during pregnancy. The findings also established that the study participants experienced maternal malnutrition and food insecurity, which subsequently increased the risk of preterm births and stillbirths during severe winters. Additionally, children also grappled with malnutrition issues in the winter months due to the scarcity of fruits and vegetables in snowy conditions.

Conclusion

The study has uncovered many challenges faced by the rural women of Bajaur. Both existing literature and current study findings highlight the importance of addressing food insecurity related to heavy snowfall, rainfall, and prolonged freezing temperatures during winter. These weather conditions have adverse effects on maternal health and pregnancy outcomes. The study also directs policymakers and stakeholders to formulate and execute climate-smart agricultural policies, and food-sustainable programs in the context of climate change. The study also suggests assisting rural populations in adapting to climate change by providing them with information and strategies for adapting to the climate change impact.

Keywords Indigenous Mothers, Maternal Nutrition, Climate change, Pakistan

List of Abbreviations

AKU	Aga Khan University
AKUH	Aga Khan University Hospital
ERC	Ethics Review Committee
AKUSONAM	Aga Khan University School of Nursing and Midwifery
MS	Medical Superintendent
DHO	District Health Officer
IPCC	International Panel of Climate Change
FAO	Food and Agriculture Organization
FI	Food Insecurity
GHG	Greenhouse Gas
KPK	Khyber Pakhtunkhwa
SDGs	Development Goals
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization
WFP	World Food Program

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Firstly, I would like to express my profound gratitude to the Almighty, Allah, for granting me the strength to achieve this success in my life and for bestowing me the patience needed to complete this study. Additionally, I extend my heartfelt thanks to the Chancellor of the Aga Khan University for the opportunity to pursue higher education at such a prestigious institution.

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Last, but not the least, I want to convey my deep appreciation to my family members and friends for their endless prayers, love, affection, and unwavering support, which were the pillars that enabled me to achieve this significant milestone.

Declaration

I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and to the best of my knowledge, it does not contain any material previously published or written by another person, except where due reference has been made in the text.

The editorial assistance provided to me has in no way added to the substance of my thesis which is the product of my own research endeavors.

(Signature of Candidate)

1st November, 2023

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Chapter One: Introduction

The chapter briefly discusses how climate change causing extreme cold weather, affects food security and maternal health. This chapter describes the background of the issue, followed by climate change, and its effect on women while the second section uncovers harsh winter and food insecurity, and the geographical location of the study setting. In addition, the chapter also presents the research gap, problem statement, and the study purpose in the northern rural regions of Pakistan. Furthermore, the last part of the chapter also includes the research question, the study significance, and the chapter's summary.

Background

Climate change is characterized as a long-standing alteration in the statistical characteristics of the climate system, which is evidenced by an odd distribution in the recorded mean during an average time span of 30 years (Wu et al., 2016). Variations in atmospheric carbon dioxide, fluctuations in global temperatures, and changes in precipitation all contribute to climate change, which also affects sea levels and salinity, agricultural yields, soil quality, nitrogen deposition, plant variety, and crop diseases (Zhang et al., 2021). The main driver of climate change is greenhouse gas (GHG) emissions, which also influence climate variables, such as temperature, relative humidity, and precipitation (G. Macassa et al., 2022). In the past two decades, the globe has experienced a large number of catastrophic weather-related calamities, including floods, winter storms, and heat waves (Stone et al., 2022).

Climate Change and Women

In many parts of the world, extreme cold weather events, such as blizzards and snowstorms, are becoming more common and severe due to climate change. The impact of extremely cold weather on maternal and infant health is an issue of concern, mainly in rural areas

where access to healthcare is limited (Desai & Zhang, 2021) (Sorensen et al., 2018). Pakistan is one of the countries that is most susceptible to climate change impacts. The country's Northern regions have experienced several extreme cold weather events in recent years, which have had a significant impact on maternal and infant health. In the Northern rural areas of Pakistan, where access to healthcare and adequate nutrition is limited, the impact of extremely cold weather on maternal and infant health is particularly serious (S. Fahad & J. Wang, 2020). Indigenous women in northern rural areas are among the most vulnerable populations affected by extremely cold weather events. They are more likely to experience food insecurity, which can have a significant impact on maternal and infant health (Abdullah et al., 2019).

The most vulnerable segment of the population are the child bearing ages mothers, pregnant women, the growing fetus, and small children, who are ignored in many cultures (Sorensen et al., 2018). Current literature reviews have studied the health outcome associated with climate change; however, there is a gap in the literature regarding the possible risks to mother health, pregnancy outcomes, and the health of prenatal and postnatal children's. Extreme cold weather can have a significant impact on women's physical, mental, and reproductive health. Moreover, it can lead to various health problems, such as hypothermia, frostbite, and respiratory infections, as well as mental health problems, such as social isolation, seasonal affective disorder, and depression (WHO, 2014) (Ntiamoah et al., 2022).

Additionally, women who are pregnant or trying to conceive are more vulnerable to the adverse effects of extremely cold weather on their reproductive health, such as reduced fertility, menstrual cycle irregularities, and even miscarriages (Desai & Zhang, 2021). Moreover, women who live in hilly areas are more vulnerable to extreme cold weather events, and are more likely to experience difficulties in accessing reproductive health services due to infrastructure damage,

transport disruptions, and other logistical challenges (Lowe et al., 2018). Climate change caused Flooding which also affected women substantially. The 2010 flood in Pakistan affected 500,000 mothers, and 1.5 million women need emergency (Nayna Schwerdtle et al., 2021).

The Paris Agreement on Climate Change, the United Nations Framework Convention on Climate Change, and the Sustainable Development Goals (SDGs) have all acknowledged the link between climate change and women's health and stressed the contribution of women to the fight against climate change. In addition, the World Health Organization (WHO) has underlined the connection between gender, health, and climate change and has offered solutions to lessen its effects on women's health (Sorensen et al., 2018) (IPC, 2023).

In addition to these, there has been a rise in the quantity of literature that establishes this connection and emphasizes the requirement of long-term solutions to this problem (Watts et al., 2015). These solutions are centered on themes of female empowerment and promotion of gender equality, through community-led programs (Patterson et al., 2017).

Extreme Cold Weather and Food Insecurity

Food insecurity (FI), defined as inadequate access to adequate food for a healthy life. FI is a global problem that affects millions of people every year (FAO, 2020). Extreme weather events due to climate change exacerbate food insecurity by disrupting food systems, increasing food prices; disrupting food production and distribution. Moreover, severe winter storms, blizzards, and heavy snowfalls can damage crops, destroy infrastructure, and block roads, making it difficult to transport food from farms to markets (Blom et al., 2022).

Secondly, extreme cold weather events, can affect the nutritional value of available food. During extremely cold weather events, people consume more calorie-dense foods, such as

carbohydrates and fats, this can lead to an increase in the consumption of unhealthy and low-nutrient foods, which can result in malnutrition and other health problems, particularly for susceptible populations such as pregnant and lactating women, children, and the elderly (Margolis & Pasiakos, 2023) (Lake et al., 2012).

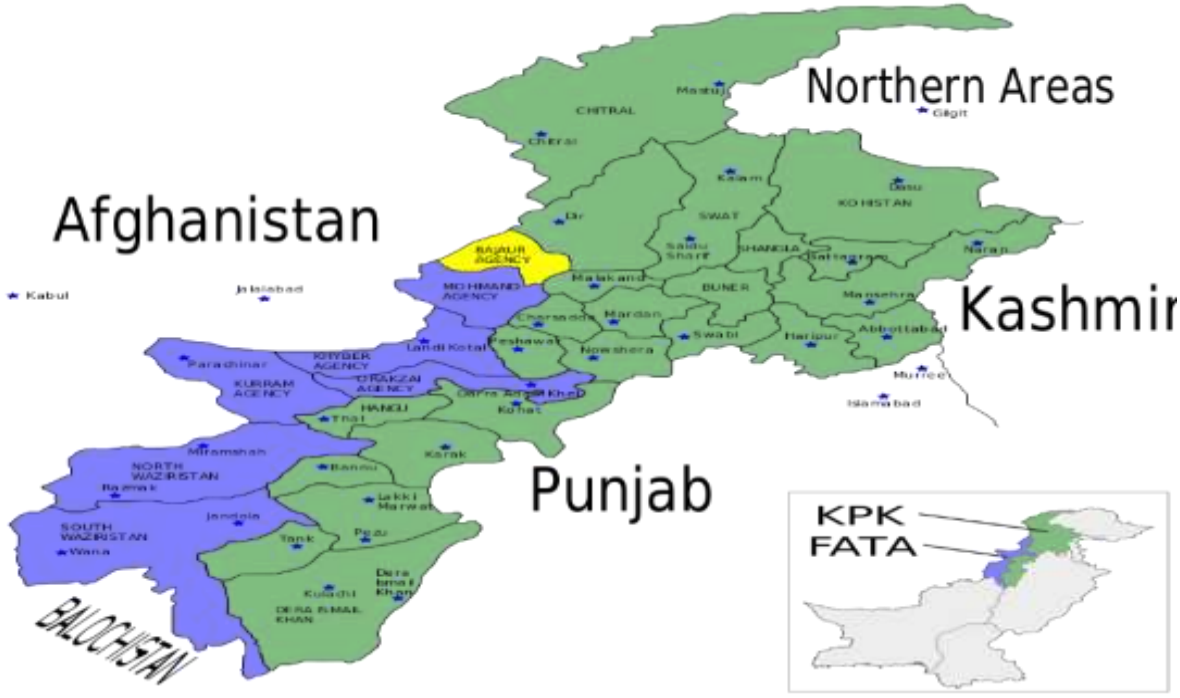
Thirdly, Extreme cold weather events can affect food security through economic shocks. When extreme cold weather events occur, households may need to suffer additional expenses, such as heating costs and home repairs, which can leave them with less money to purchase food. Moreover, extreme cold weather events can also cause disruptions in the labor market, leading to job losses, reduced work hours, and decreased income. These economic shocks can push households that are already food insecure into further hardship, limiting their ability to access food (Sharma et al., 2022) (Das & Mishra, 2022).

In conclusion, extreme cold weather events have significant impacts on food insecurity, particularly for vulnerable populations. Hence, it is essential for policymakers to consider the effect of extreme cold weather events on food security when developing policies to address food insecurity. Such policies should aim to strengthen food systems, increase the resilience of vulnerable populations, and improve access to affordable and nutritious food.

Geographical Location of the Study Setting

Pakistan is located in South Asia, bordered by Iran to the West, Afghanistan in the Northwest, China in the Northeast, India in the Southeast, and the Arabian Sea in the South. Pakistan has a diverse agroecological system, including irrigated plains and high mountain valleys. Environmental factors like temperature, nutritional content, soil characteristics, and rainfall have a considerable impact on a variety's performance (S. Fahad & J. Wang, 2020).

Figure 1 Showing Northern Region of Pakistan, Adapted from Wikipedia



District Bajaur

To the East of the Kunar Valley, the region of Bajaur is located at a significant elevation. It is roughly 72 km long and 32 km wide close to Kunar Valley, from which a continuous range of rugged frontier hills, establishing a barrier, divides it. Nonetheless, it is easily navigable at one or two spots. The Khyber Pass in Pakistan which serves as the crossing point for the historic main road that once goes to Kabul to Pakistan via this barrier (Younis et al., 2021). November marks the beginning of winter and lasts until May. The winter is extremely cold and freezing; the temperature typically falls below the freezing point. Fresh water flows from many springs and streams across the area, creating a source of irrigation and drinking water. In the Bajaur region, mud is primarily used to build house (Khapung, 2016).

Figure 2 Map of Bajaur and snowfall in Bajaur adapted from DAWN Press

In Bajaur, women's and infant health are almost at risk due to extremely cold temperatures. These indigenous women cannot avail health services in rain and snowfall. Mothers and babies are vulnerable due to snowfall, extremely cold temperatures, life activities, healthcare needs, and maternal health nutrition, which cannot be managed properly. Moreover, these indigenous populations face complex, difficult, and challenges are certainly affected by climate change through food security, and maternal nutrition.

Some quantitative research has focused on the seasons of nutrient consumption during childbearing ages, but the processes through which climatic variation causing food insecurity for the population is uncovered. Therefore, the current study investigated how mothers in rural Bajaur are vulnerable to climate change, as well as how these rural women perceive the environment's effects on food security, during the seasonal variation, and impact on maternal-infant health over time.

Literature Gap

There is a substantial gap in the literature on maternal nutrition during hash winter caused by climate change. Climate change is a continuum, having both global warming and extreme freezing temperature. The global warming and their impact on maternal health is extensively studied but the left side of the continuum, the extreme cold temperature is ignored. The northern region of KPK has extremely cold temperature noticed in the last decades, which caused significant food insecurity for women and children. This phenomenon is uncovered with recent research. The research gap highlighted the need for further research to explore the experiences of maternal women and to identify effective strategies to improve maternal nutrition and health during climate change conditions in rural Bajaur, Khyber Pakhtunkhwa, Pakistan.

Problem Statement

Climate change is a significant global challenge, and its adverse effects on human health are becoming apparent. In rural Bajaur, Khyber Pakhtunkhwa Pakistan, maternal women are susceptible to the impact of climate change, particularly heavy snowy rains, which affects their access to proper nutrition. Despite the importance of maternal nutrition for ensuring healthy pregnancies and optimal birth outcomes, there is a gap of research on the experiences of maternal women with their maternal nutrition during climate shifts. Therefore, there was felt to explore the experiences of maternal women in this context to identify the challenges they face and the techniques they employ.

Aim of the study

The study aimed to explore the experiences of indigenous women with maternal nutrition in harsh winter caused by climate change in rural Bajaur, Pakistan.

Purpose of the study

The purpose of the study is to explores how climate change poses challenges for pregnant women's nutrition in rural Bajaur, Khyber Pakhtunkhwa, Pakistan, especially during harsh winters. The goal is to understand and address the impact of climate change on maternal nutrition, informing strategies and policies for similar areas facing food shortages.

Research Questions

- What are the experiences of child bearing ages mothers regarding maternal nutrition in harsh winter caused by climate change in District Bajaur, Khyber Pakhtunkhwa?

- What are the challenges faced by indigenous rural mothers regarding maternal nutrition in harsh winter caused by climate change in District Bajaur, Khyber Pakhtunkhwa?

Significance of the Study

After conducting a thorough literature review, the researcher has found that there is a limited exploration regarding the impact of climate change on food security and its effect on maternal nutrition in Pakistan. Therefore, the current study is highly significant in understanding the relationship between climate change, maternal nutrition, maternal health, food unavailability, food insecurity, and maternal-infant health outcomes.

Moreover, this this study will offer essential data for future research on the impacts of climate change on maternal health in the cold, hilly, mountainous areas of the country. These regions are especially vulnerable to the effects of climate change, and this information will be crucial for understanding and addressing these challenges.

Summary of the Chapter

The chapter explored how women are dealt with maternal nutrition challenges, during extreme cold weather caused by climate change. Access to adequate maternal nutrition is a significant problem for women, exacerbated by freezing temperature in the harsh winter. This challenge is compounded by several factors, including lack of awareness in these rural women regarding climate change and maternal nutrition. These issues have an impact on maternal and infant health outcomes, including a high risk of malnourishment, growth stunting, and other medical issues.

Chapter Two: Literature Review

Introduction

The chapter provides an in-depth review of existing literature on climate change, extremely cold weather, maternal nutrition, maternal health, and how extreme cold temperatures affect food security and then indirectly affect maternal-infant health. The literature synthesis begins with the search strategy followed by the PRISMA chart, which guided the literature review. The literature review is divided into four parts, the first part entails the search strategy, PRISMA chart, extraction table, conceptual definition, and conceptual framework, while the second part describes climate change and women's health. The third part describes how climate change affects food insecurity. Furthermore, the last part of the chapter covers the gap analysis, conclusion, and summary of the chapter.

Search Strategy

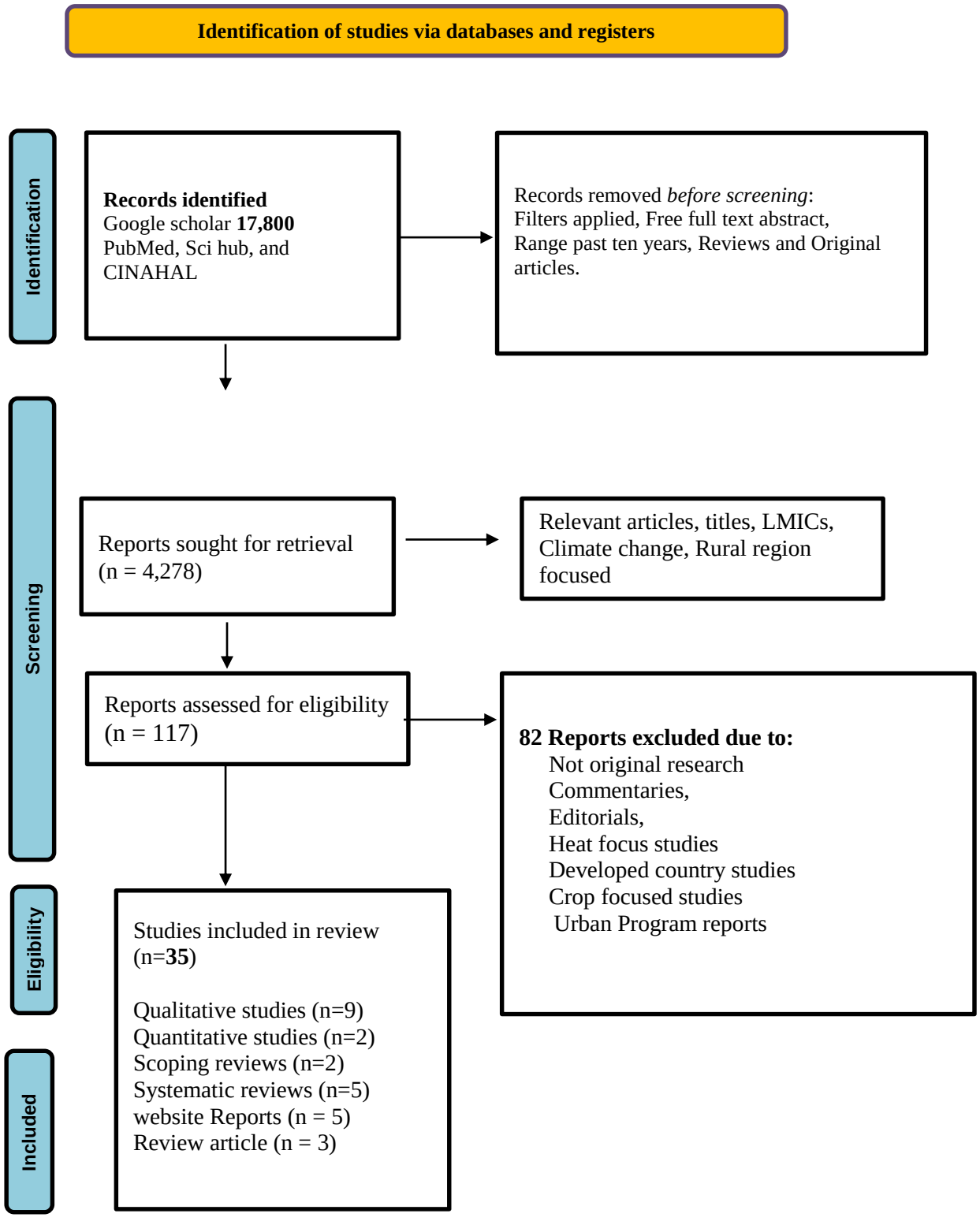
An organized and comprehensive literature review was carried out to search scientific articles. Detailed data were retrieved through PubMed, Google Scholar, Science Direct, and CINAHIL by using the following keywords "Climate change" OR "Extreme cold weather" OR "Harsh winter" AND "Food insecurity" OR Food Unavailability" OR Food Shortage" AND "Maternal" OR "Maternal Women" OR "Indigenous women" OR "Childbearing Ages Women" AND "Maternal health" OR "Maternal Health Outcomes" properly combined by Boolean operators as shown below.

"Climate Change"[Mesh] ("Climate Change"[Mesh]) AND "Women's Health Services"[Mesh] (("Climate Change"[Mesh]) AND "Women's Health Services"[Mesh]) AND OR Maternal Health" OR Maternal Infant Health Implication" OR "Food Insecurity "OR Food Unavailability [Mesh]

Citation chaining was also used to identify further literature that was not indexed in the selected databases. To expand the related search, the search engine was instructed to include all the publications during the past ten years, and full text. The searched database generated 17,800 results for climate change, maternal women, maternal nutrition, and food insecurity. The combined data was then assessed for duplication and non-eligibility, and out of 500 articles, 250 were excluded after reading the title and abstract. Furthermore, 117 papers were excluded after reading the full text. Finally, 8 qualitative and 15 quantitative studies, 03 scoping reviews, 02 systematic reviews, and 07 reports were included that were relevant to the research questions.

Furthermore, the authors, publication year, title, demographics, location of study, study population, study design, results, conclusions, and limitations were all extracted and put into the table form from each study. This literature searched also revealed that no such studies could be found that portrayed the experience of maternal women during the cold winters in Pakistan. The total number of searches found through the literature review is represented below in the form of a PRISMA chart flow.

Figure 3 PRISMA flow diagram



Conceptual Definitions

Climate change

Climate change refers to any change in climate over time, whether due to natural variability or because of human activity (WHO, 2023)

Food Security

Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (WFF, 2022).

Food Availability

The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports including food aid (WFS, 2022).

Food Access

Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic, and social arrangements of the community in which they live including traditional rights" (WFS, 2022)

Hunger

Hunger is a term that literally describes a feeling of discomfort from not eating and which has also been used to describe undernourishment, especially in reference to food insecurity (UNSCN, 2020).

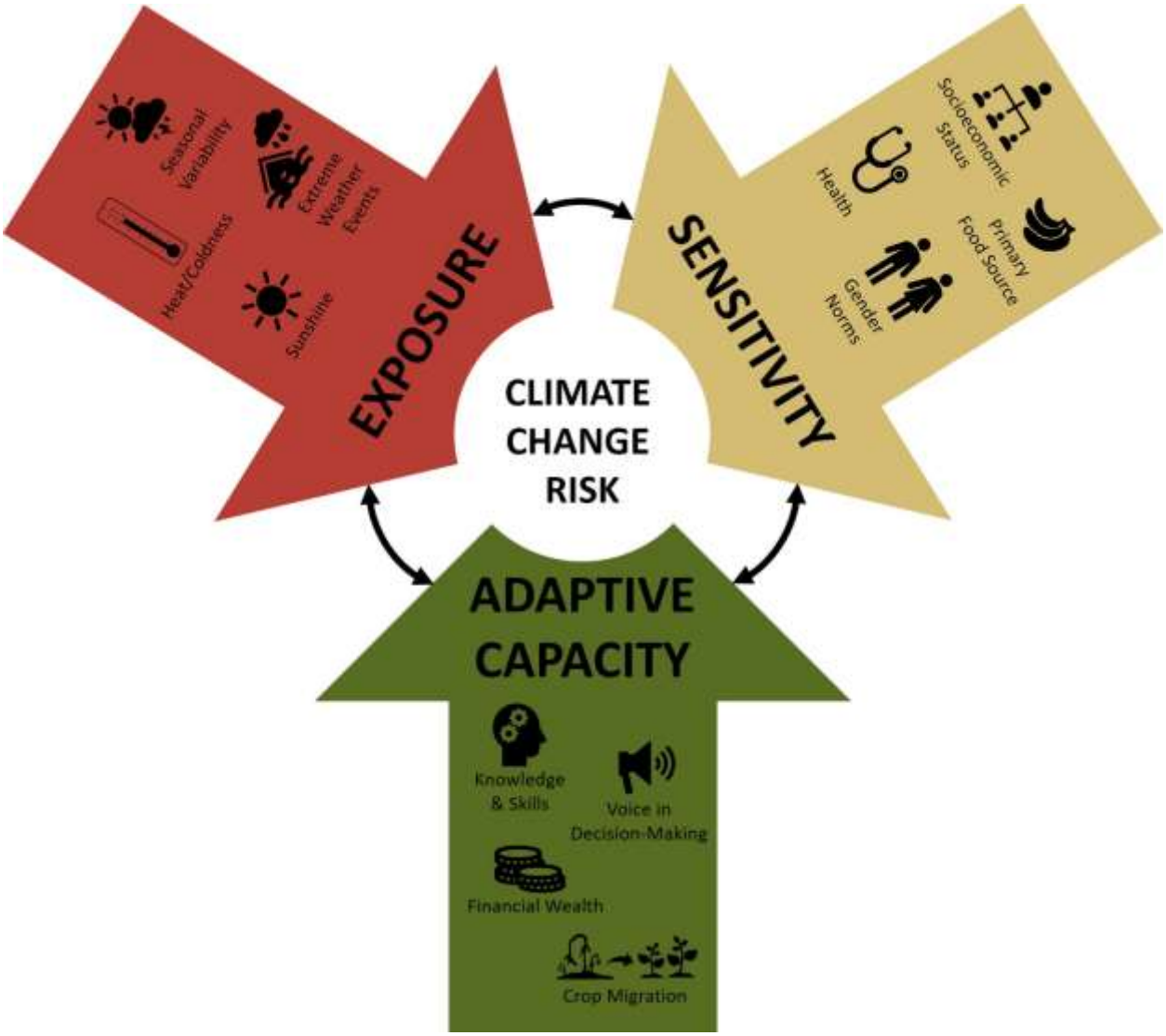
Malnutrition

Malnutrition is a broad term that refers to all forms of poor nutrition. Malnutrition is caused by a complex array of factors, including dietary inadequacy deficiencies or imbalances in energy, protein, and micronutrients, infections, and sociocultural factors. Malnutrition includes undernutrition as well as overweight and obesity(FAO, 2020).

Conceptual Framework & Approach to Research

The experiences of Indigenous women in Rural Bajaur, in relation to the effects of extreme cold weather conditions due to climate changes on maternal nutrition studied by the researcher with the help of a framework adapted from (Bryson et al., 2021). It was modified for use in the rural context and served as a foundation for this study. The researcher also studied how variations in weather and temperature conditions impacted access to nutritious foods, medical care, and outcomes for pregnant women and childbearing ages.

Figure 4 Conceptual framework highlighting factors affecting climate change in Bajaur: adapted from (Bryson et al., 2021).



Factors such as socioeconomic situation, social standards, and cultural marginalization that make indigenous women more susceptible to these effects that were investigated during the study. This conceptual framework also served as a roadmap for the research question, collecting data, and analysis. The researcher also explored how maternal nutrition of indigenous women is

impacted by prolonged exposure to cold weather, how gender norms and socioeconomic status affect sensitivity to cold weather, and how the ability to adapt is influenced by knowledge, experience, financial resources, and crop migration. The framework was also used for analyzing and evaluating the study's results, highlighting trends, and themes relating to exposure, sensitivity, and adaptive capacity.

Exposure

In the context of this study, “exposure” refers to the extreme cold weather conditions, weather related disasters, thunderstorms, heavy snowfall, freezing temperature, heavy rainfall, prolonged cloudiness and seasonal variability. The exposure of indigenous women, in Rural Bajaur, lead to health complications during pregnancy and childbirth, such as hypothermia, respiratory infections, congenital and non-congenital anomalies, and low birth weight. Additionally, indigenous women may face challenges in accessing healthcare services due to harsh cold weather conditions.

Sensitivity

The term “sensitivity” in the context of this study, refers to the degree of susceptibility of indigenous women in rural Bajaur to the adverse effects of extreme cold weather, heavy snowfall, heavy rainfall, freezing temperature, and thunderstorms. This susceptibility is determined by different factors, like their financial situation, the primary source of their food, and the cultural expectations from their gender roles. Indigenous women in these rural households have limited access to nutritious food and healthcare services, and other resources, making them also more vulnerable to the effects of cold weather conditions.

Adaptive Capacity

"Adaptive capacity" in this context refers to the capability of these indigenous women in rural Bajaur to respond to the effect of harsh cold weather, seasonality, and weather events. This can be affected by multiple factors, such as the understanding level, experiences, strategies, and skills of these rural women related to maternal health, economic conditions, and crop migration. Indigenous women with higher levels of understanding and more experience may be more aware of the effects of cold weather events on their nutrition. When food is in short supply, crop migration may serve as an alternate source of food, while financial resources can enable access to health care and healthy food.

Climate Change and Women Health

Significant global issues, such as climate change, have recently risen to the top of the global health agendas**.** Certain water-borne diseases and their geographic range have expanded due to climate change into areas that were previously inappropriate for their existence. The environmental factors that make these regions more conducive to the growth and transmission of disease-carrying agents, such as higher temperatures, more precipitation, and humidity, are mostly responsible for this. Infectious infections are spreading more broadly as a result, threatening the health of the public (Coates & Norton, 2021). It is concerning that climate change agreements have not considered nutrition security. Women, children, and marginalized populations are among the most vulnerable and are at risk due to the possible effects of climate change. According to estimates, 188 million people were impacted by floods and 103 million by drought in 2010 (Tirado et al., 2013).

According to the IPCC 4th Assessment Report, if the current conditions continue, it is predicted that around 200 to 600 million more people will experience hunger by the year 2080

(IPC, 2023). In the developing world, calorie availability is predicted to decrease in 2050, leading to an increase of 24 million undernourished children 21% more than in a world without climate change nearly half of whom would reside in sub-Saharan Africa (IFPRI, 2015). Additionally, it has been predicted that compared to a world without climate change, climate change will result in an overall rise in low stunting of 1% to 29% in the year 2050. Rates of severe stunting are predicted to rise from 23%, in central sub-Saharan Africa, to 62% as a result of climate change (IPCC, 2015).

Additionally, more frequent droughts brought on by climate change can lead to food insecurity and famine, both of which are associated with worse health outcomes (Yue & Gao, 2018). Moreover, climate change also has an impact on air quality, by altering the concentration and distribution of pollen and other allergens and affecting the emission, transport, dispersion, chemical transformation, and deposition of pollutants. The deteriorated air quality will have an immediate impact on ecosystems, human health, and the climate (Orru et al., 2017).

Finally, the result could be traumas due to climate-related disasters that are more frequent, intense, and long-lasting and the devastation of landscapes, which lessens the sense of comfort and belonging that people get from their connection to the land (G. Macassa et al., 2022). The International panel on climate change (IPCC) third assessment report also states that adaptation has the potential to lessen harmful effects of climate variability and to enhance positive outcomes, but that it will suffer costs and not completely prevent harms. Additionally, it is argued that strategic adaptation can support autonomous adaptation and that human and natural systems will, to some extent, adapt independently of one another. However, there are more options and incentives for human system adaptation than for system adaptation to protect natural systems (IPCC, 2015). A recent study noted that effects of climate change on mental

health, that weather changes resulted psychophysical symptoms, like mood swings, irritability, anxiety, physical weakness, hypertension headaches, hyperalgesia, pains, and autonomic symptoms (Cianconi et al., 2020).

Another scoping review, on “mental health impact of climate change on women health” has revealed that climate change is predicted affect mental health through a variety of direct and indirect paths. One of the direct routes is exposure to stressful situations, like wildfires and other harsh weather-related catastrophes. The majority of indirect pathways involve a range of economic, political, and social variables, such as housing, employment, and poverty, which have an impact on mental health. It is anticipated that vulnerable people and areas, especially those in low-income countries, may suffer significant damage.(Stone et al., 2022) (Coates & Norton, 2021). As a result of the harmful impacts of climate change on the ecology of the Earth, there are now more natural disasters, vector-borne illnesses, poor air quality, and extreme climatic temperature variations, all of which have an adverse influence on human health (Rylander et al., 2013) (Desai & Zhang, 2021).

Numerous studies have also established a link between climate change and health, stressing poverty, food insecurity, isolation from other people and places, and deteriorating social norms as major variables that increase the adverse effects of climate change (Langer et al., 2015). Pakistan, which is a developing country in South Asia particularly more vulnerable to severe climatic risks including, floods and droughts with temperature variations in precipitation, and extreme rainfall as the main drivers of climatic variability. From 2010 to 2014, floods resulted in significant destruction of life and belongings and a mass migration of residents from their homes. Three consecutive severe floods have plagued Pakistan's agriculture industry, disrupting both the country's general economy and agricultural sector. The country's single

largest sector, agriculture, accounts for 21% of all national income; however, its share has declined over time, although it employs 45% of the labor force. Nearly 70% of the people live in rural areas, and most depend entirely on agriculture (Shah Fahad & Jianling Wang, 2020). In Pakistan's GDP, the agricultural sector accounted for 64% in 1947-1948, 53% in 1959-1960, 32% in 1977-1978, and 24.5% during the decade of the 1990s. Currently, it represents 21.4% of the total output (Shah Fahad & Jianling Wang, 2020).

A household survey was conducted by Farhad and Wang in the rural area of Khyber Pakhtunkhwa province, Pakistan's. The study findings showed that the main adaptation strategies used in the study area were changes in fertilizer, crop type and variety changes, pesticide use, seed quality, planting of trees for shade, farm diversification, and water storage. It is a common occurrence for people to adjust to the effects of climatic fluctuation, in general and in the farming industry, in particular (Shah Fahad & Jianling Wang, 2020).

After another round of floods in Pakistan's from 2010 to 2014, diseases including dengue fever, diarrhea, malaria, cholera, and other respiratory illnesses, were found to be the detrimental factors that were the result of climate change. Land degradation and harm to roads, communications, and other amenities were all recorded in the area due to the torrential rain and flooding.

Climate Change and Women Health

Around 1.3 billion people live below the poverty line, globally, with 70% of those being women in low- and middle-income countries (LMICs) (Sorensen et al., 2018). Climate change aggravates the unique health requirements of women, especially during pregnancy, when maternal health and nutrition are crucial for the developing fetus and the newborn (Rylander et al., 2013). A scoping review was carried out to understand the connection between climate

change and women's health more fully. In this scoping review more of the studies included that were carried in (LMICs), four main issues were identified and were published after 2010, and primarily used qualitative study designs. These four issues were how women are affected by climate change, women's health consequences, susceptibility factors, and adaptation options.

According to the scoping review, women's health is more at risk because of climate change vulnerability, particularly in LMICs. Hence, in order to increase resilience, it is helpful to get insight from women's perspectives on strategies for mitigation and adaptation (Desai & Zhang, 2021). Another similar qualitative study was conducted in Bangladesh, by Abdullah et al, in 2019, in which the authors investigated how rural Bangladesh's population perceives the deaths of mothers brought about by extreme weather events, particularly floods. According to their findings, extreme weather events are a substantial risk factor for pregnant women and maternal complications, and death, due to lack of access to antenatal care facilities.

The results of the study also emphasized the challenges and problems experienced by pregnant mothers in medical care settings due to catastrophe flooding. The authors also suggested the need for a better understanding of the health of mothers and climate change-related issues, in order to support pregnant women in the face of climate change (Abdullah et al., 2019). Women commonly have limited access to economic and technical support after disasters and severe weather conditions caused by climate change. Due to societal and cultural barriers, women generally have restricted opportunities for education, paid employment, and land ownership, all of which make them more vulnerable to climate change (Langer et al., 2015). The complicated relationship between gender inequality and women's health is compounded by the ongoing problem of climate change (WHO, 2015).

The Paris Agreement on Climate Change" and "United Nations Framework Convention on Climate Change" recognize the connection between climate change and women's health, and the role of women in combating climate change has been prioritized (Langer et al., 2015). The World Health Organization (WHO) has also emphasized the significance of gender, health, and climate change and provided measures for mitigating these challenges (WHO, 2023). Additionally, there has been an increase in the quantity of work that has been produced that identifies this relationship and emphasizes the necessity for long-term solutions to this problem. Through community-led initiatives, national legislation, and global resilience, the solutions are focusing on themes of women's empowerment and advocacy for gender equality (Gloria Macassa et al., 2022).

According to Abdullah et all that 16 studies were found that had been conducted in different countries to studies the association between climate change and women's health outcomes. They also concluded that due to food insecurity, women were more likely to experience nutritional deficits such as malnutrition and anemia (Abdullah et al., 2019). Another similar study conducted, by Rylander, in 2013, concluded that women in rural regions are also more likely to be at risk for vector-borne illnesses, as they use water for drinking from rivers and ponds. He further added that with extreme temperatures and food insecurity, pregnant women were more likely to have hypertension, tiredness, miscarriages, and stillbirths (Rylander et al., 2013). In the same way, Desai and Zhang, in 2021, also concluded in a scoping review, that particularly in rural regions, without access to renewable energy, mostly women suffered respiratory illnesses, due to use of dangerous traditional biomass to cook meals, thus inhaling poisonous gasses. Hence, climate change and maternal health were shown to be strongly associated (Abbas, 2022) (Desai & Zhang, 2021).

Climate Change, Gender Inequalities, and Rural Regions

According to a systematic review, conducted by Fahad and Wang in Pakistan in 2020, on climate change, vulnerability, and its impact in rural Pakistan, Pakistan is one of the more susceptible countries due to climate change, especially in the region of Southeast Asia as it frequently experiences extreme weather events. Climate change has also exacerbated the gender and socioeconomic disparities that already exist for women in rural and remote areas in Pakistan. The farming sector, groundwater, nutrition, soil fertility and organic matter, health problems, and poverty are all negatively impacted by climatic change. Reviewing the effects of climate change, and the farm-level adaptation techniques adopted in response to temperature and precipitation variability was the primary goal of this study (Shah Fahad & Jianling Wang, 2020). According to published research, Pakistani farmers use a variety of adaptation strategies to deal with climate change, including altering their use of fertilizer, crop variety, pesticides, seed quality, storage of water, farm diversification, planting trees for shade, irrigation methods, engaging in off-farm activities, moving permanently or temporarily, and selling assets. ``When catastrophic weather events destroyed agricultural crops and reduced household income in extremely distant places, the patriarchal structure of the societies increased gender discrimination and violence against women. Women were noted as frequently eating at the end of the family's mealtimes, enabling the males and kids to eat first (Coates & Norton, 2021).

The scoping review led by Desai and Zhang in 2021 concluded that women's face lacks basic rights, exclusion from societal decision-making, and financial dependency on men, all these have negatively impacted their health and ability to care for others. Particularly women in rural regions, have lesser access to education and health care facilities. These factors add to the gender-based climate change vulnerability, by preventing women from taking advantage of

opportunities to reduce their exposure to its effects. Moreover, climate change has a negative impact on maternal health, affecting birth outcomes and infant health. they have also concluded that birth abnormalities can increase when pregnant women are exposed to extremely cold temperatures, and heavy snowfall, raising their healthcare needs (Desai & Zhang, 2021).

Women's vulnerability is made even more acute by their limited access to education, career prospects, and participation in economic decision-making. Women may not have availability to knowledge that could raise their awareness and comprehension of the implications of climate change, if they do not have access to education and work, which is a crucial enabling element for adaptive adjustments at the individual and societal levels (Patterson et al., 2017). Hence, women who live in rural and distant locations, where they generally have restricted access to services and information, should pay particular attention to this. Due to social and cultural issues, women also experience healthcare access inequality as frequently as men do globally (Coates & Norton, 2021).

Similarly, the study led by Bunce et al showed that hormonal changes during pregnancy make the immune system more sensitive to temperature changes; they also make women physically more vulnerable. Extreme temperatures also have an impact on both antibodies and cell-mediated immune responses, which leaves people physiologically more susceptible to contracting infectious diseases, particularly vector-borne infections, as has been amply documented in the review (Bryson et al., 2021).

Hunger, Malnutrition, Food Insecurity, and Concern Related to Climate Change

According to FAO (2008), having sufficient food that is readily available, reliable in supply, healthy, and affordable for people and households is termed Food Security (FS). Global food security is significantly affected by climate change, with some of those effects already

being experienced while, Food Insecurity (FI), defined as inadequate or uncertain access to adequate food for a healthy and active life, is a global problem that affects millions of people every year (FAO, 2020). The impact of climate change on food security, livelihoods, family food access, maternity and child care, health, sanitation, and access to water, and several socioeconomic factors that influence nutrition security is already being felt.

The Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report summarizes that the adverse effects of changing weather patterns and precipitation, on agricultural production, and consequently, on food security and malnutrition in developing countries, constitute the largest single adverse impact of climate change on health because of the extremely large number of people that may be affected (IPCC, 2015). For many indigenous people, food insecurity in seasonality is becoming an increasing issue for them, adaptation to a changing climate is more difficult because of their strong reliance on the land, due to gender and culture biases, and lack of participation in decision-making groups, among other things. This affects the security of food supply (Bryson et al., 2021).

Similarly, A cross sectional study was carried out in rural northern Bangladesh from February 2013 to February 2015. The purpose of the study was to measure the association of seasonality with dietary diversity, household food security, and nutritional status among pregnant women in a rural district of northern Bangladesh. The study included 288 pregnant women, from twelve villages of the Pirganj sub-district, Rangpur District. Data were collected on demographics, household food security, and dietary diversity. Dietary diversity and seasonality were found to be related (P = 0 .026) and to food access at home (P = 0.039). The diet diversity was significantly reduced in the spring (P = 0 038) and summer (P = 0 029). The security of food declined particularly in the spring (P = 0 006) and at the end of autumn (P = 0 009).

Furthermore, the results also showed that seasonality was associated with dietary diversity and household food security, with food security deteriorating during the lean seasons and dietary diversity deteriorating during the second 'lesser' lean season and the season immediately after. In addition, the study highlights the need for interventions that recognize the role of seasonality in diet and food security to prevent seasonal declines, particularly for low-income, subsistence-farming communities (Sauer et al., 2018).

A Mix study was conducted by Patterson et al, between January 2013 and April 2014, in Kampala Uganda. The purpose of the study was to understand how the sensitive Uganda's indigenous population in Batwa, of Kanungu District was to seasonal fluctuation. In this mix method study six cross-sectional retrospective surveys, six focus groups, and six semi-structured interviews were used to collect data. Both the quantitative surveys and qualitative interviews found that dry weather had an association with higher Food Insecurity in Batwa. The study furtherly added that Global food insecurity (FI) is predicted to worsen as a result of climate change, especially among groups that rely on maintenance farming (Patterson et al., 2017).

Another similar systematic review conducted in India, by (Sorenson at al in 2018). explored the predisposition of women to food insecurity and malnutrition. The study results revealed that cultural practices that place a higher priority on feeding children can make this vulnerability even worse. During the menstrual cycle, during pregnancy, and during feeding babies, women's nutritional needs increase, and poor nutritional status can result in anemia, cognitive problems, and poor household activities.

Furthermore, maternal undernutrition is also linked to complications during pregnancy and perinatal mortality, as well as significant impacts on neonatal development. Their findings

also showed that women are more likely to die after childbirth in areas where iron-deficiency anemia is common (Sorensen et al., 2018).

Food and Agriculture (FAO) also states that the chance of a woman dying during childbirth is up to 20% higher in areas where iron-deficiency anemia is common (FAO, 2020). The majority of agricultural production and a significant portion of the world's food supply is carried out by women in poor countries. However, when shifting climatic conditions make successful agricultural production impossible, the livelihoods and dietary requirements of these indigenous mothers are put at at-risk (Sorensen et al., 2018). Another study conducted in Bangladesh in 2019, the study investigated how rural Bangladeshi populations, particularly those in flood-prone regions, perceived maternal fatalities and problems after natural disasters. Three focus groups and eight in-depth interviews were conducted with members of marginalized communities in the Netrakona district's Khaliajhuri sub-district.

According to the study, antenatal care and doctors are inaccessible to pregnant women during flooding, which is a substantial risk factor for maternal death and problems. Since boats are the only means of transportation and skilled labour attendants are hard to come by, many deliveries end in maternal deaths, while being transported from the community to the hospital.

The rural community views maternal deaths brought on by calamities as a normal occurrence. Preparation is required to help pregnant women during disasters; however, local medical professionals and volunteers are not adequately informed about maternal health, related care, and problems during catastrophes (Abdullah et al., 2019). Furtherly, they added that the Asian region has the highest rate of malnutrition, globally, with more than 22 percent of the population suffering from undernourishment. Attempts to combat malnutrition may be impeded by climate change-related damage to food security, which would worsen existing health

conditions. Therefore, it is critical to understand how climate change may affect food security and in, turn, maternal nutrition and health (Abbas, 2022).

In contrast, the northern areas of Pakistan have major concerns related to food security, changes in precipitation, harsh cold temperatures, and severe weather conditions that affect crop growth and yields, as well as agricultural pests and illnesses (Das & Mishra, 2022). Extreme cold weather events, which are becoming more common and severe due to climate change, exacerbate food insecurity by disrupting food systems, increasing food prices disrupting food production and distribution, and limiting access to food. Severe winter storms, blizzards, and heavy snowfalls can damage crops, destroy infrastructure, and block roads, making it difficult to transport food from farms to markets (Blom et al., 2022).

Secondly, extreme cold weather events can affect the nutritional value of available food. In extremely cold weather events, people consume more calorie-dense foods, such as carbohydrates and fats, which can lead to an increase in the consumption of unhealthy and low-nutrient foods, and result in malnutrition and other health problems, particularly for susceptible populations, such as pregnant and lactating women, children, and the elderly (Margolis & Pasiakos, 2023).

Thirdly, extremely cold weather events might compromise food security by causing economic shocks. The cost of heating and home maintenance may increase for households during periods of extreme cold, leaving people with fewer resources for food purchases. Extreme cold weather incidents can also disrupt the labour market, resulting in job losses, shortened workdays, and lower wages (Sharma et al., 2022).

In conclusion, extreme cold weather events have significant impacts on food insecurity, particularly for vulnerable populations. It is essential for policymakers to consider the effect of extreme cold weather events on food security when developing policies to address food insecurity. Such policies should aim to strengthen food systems, increase the resilience of vulnerable populations, and improve access to affordable and nutritious food.

Conclusions and Recommendations

Literature review emphasizes the importance of incorporating nutrition and health in evaluating and implementing mitigation and adaptation plans for climate change. It recommends a twin-track strategy, that combines nutrition-specific initiatives with multisector approaches, for sustainable and temperature-resilient agriculture, health and social protection programs, disaster mitigation, and community-based development for the vulnerable populations, like women and children.

In addition, the review also highlighted the need for climate funds and private investment to take nutrition into consideration, and for national governments to incorporate nutrition into development and adaptation strategies that are climate resilient. Furthermore, it also stresses the importance of stakeholder engagement, policy coherence, and international collaboration to safeguard women and children from malnutrition and to improve nutrition security in the face of climate change. Overall, the detailed literature review underlined the urgent need for leadership, political will, and human rights-centered approaches, to advance the agenda towards sustainable growth and nutrition security in the context of climate change and weather extremes.

Gap Analysis in Literature

The above studies revealed some gaps that are listed below.

1. Lack of attention to climate change impacts maternal nutrition: Previous research has not adequately addressed the impacts of climate change, particularly cold weather, on maternal nutrition. This gap highlighted the need for more research that specifically addresses how climate change may impact maternal nutrition and health outcomes.
2. Limited focus on rural populations: Much of the existing literature on maternal nutrition and health outcomes has focused on urban populations, with less attention given to the experiences of rural populations, particularly in low- and middle-income countries.
3. Need for culturally responsive approaches: Previous research has highlighted the importance of culturally responsive approaches to maternal health and nutrition, but there seems to be limited research that specifically addresses the unique cultural contexts of Indigenous women in rural areas.
4. Limited research on maternal and infant health outcomes: While there is some literature on the relationship between maternal nutrition and health outcomes, for both mothers and infants, there may be limited research that specifically addresses the implications of indigenous women's experiences in rural areas with regard to maternal nutrition and climate change on maternal and infant health outcomes.

In summary, this gap highlighted the need for more research that specifically focuses on the potential implications of in the light of indigenous women's experiences with maternal nutrition in the context of climate change for maternal and infant health outcomes.

Summary of the Literature

The literature review highlights the insufficient research on indigenous women's maternal nutrition with regard to climate change, particularly in low- and middle-income countries. It also emphasizes the necessity for culturally responsive approaches. Additionally, the review notes the limited understanding of how climate change affects women's maternal nutrition and its impact on maternal and infant health outcome.

Overall, the literature review emphasized the need for more research that specifically addresses the unique cultural contexts of indigenous women in rural areas, and the potential implications of climate change on maternal nutrition and health outcomes. The study's focus on indigenous women's experiences, with regard to maternal nutrition in the context of climate change and cold weather, has the potential to contribute the significant gap in the existing literature and contribute to the development of effective interventions to improve maternal and infant health outcomes in rural communities.

Table 1. Literature Review Extraction Table.

	Author (s) Name & Year	**Region**	**Study Design**	**Key Findings**
1	Abdullah et al., 2019	Rural Bangladesh	Qualitative study	Climate Change, exposure, and Risk and health outcome
2	(Macassa et al., 2022)	Portugal and the Philippines	Qualitative study	Climate change adaptation and mitigation
3	(Kathryn et al., 2017)	Burkina Faso West Africa	Qualitative study	Seasonal hunger among childbearing hunger
4	(Saulnier et al., 2022)	Cambodia	Qualitative study	Childbearing service during flood
5	(Ramona et al., 2021)	Mauritius	Review article	Climate change and food safety
6	(Nayna. S et al., 2021)	Bangladesh	Qualitative study	Risk of health in climate change
7	(Abdullah et al,. 2019)	Bangladesh	Qualitative study	Climate change and maternal mortality
8	(Fiona C et al., 2021)	Australia	Scoping review	Climate change and mental health
9	(Bryson et al., 2020)	Uganda	Qualitative study	Climate change, seasonality, and food security
10	(Zalak & Zhang 2021)	Australia	Scoping review	Climate Change and Women's Health
11	(Cecilia. S et al., 2018)	India	Review article	Climate Change, impact and Opportunities to Women in India
12	(Linda C. et al., 2021)	USA	Special article	Climate change and women's health
13	(Shantelle S et al., 2022)	Gambia	Qualitative study	Climate change and pregnancy
14	(Sarah M et al., 2017)	Uganda	Qualitative study	Seasonality and perinatal health

15	(Tirado et al., 2013)	USA	Cross-sectional study	Changing climate and nutrition
16	(Fahad1 & Wan 2019)	Pakistan	Review article	Climate change, vulnerability, and its impacts in rural Pakistan: a review
17	(Hofmeijer & J. 2012)	Canada	Case study	Community vulnerability to the health effects of climate change among indigenous populations in the Peruvian
18	Charlotta Rylander et all 2013)	Ethiopia	Systematic review	climate change and the potential effects on maternal and pregnancy outcomes
19	(FAO,2020)	Rome	Report	The state of food security and nutrition
20	(IPCC, 2023)	Pakistan	Report	Climate change and food insecurity
21	Cecilia Sorensen et all (2018)	India	Systematic Review	Climate Change and Women's Health: Impacts and Opportunities in India
22	(IPCC, 2015)	World wide	Website report	Climate change and food insecurity
23	(WFS, 2022)	World wide	Report	World Food Sumit
24	(WFF,2022)	Globe	Report	World food Forum
25	(WHO, 2023)	Globally	Report	WHO climate change

Chapter Three: Research Methodology

The chapter provides a detailed description of the methodology, comprising seven sections. The first section outlines the study design followed by an in-depth presentation of the study population and setting. The third section elaborates on the sampling strategy and sample size selection. Afterward, the recruitment process for participants is described. Furthermore, it also describes the data collection and data analysis process. Moreover, the chapter highlights, the study's rigor and ethical consideration that were upheld throughout the study. Finally, the chapter concludes with a brief summary of its contents.

Study Design

A descriptive exploratory qualitative study design was used because of the nature of the topic under discussion, which is, the impact of climate change on maternal nutrition during pregnancy. This design is considered appropriate to explore and collect in-depth information regarding the perceptions and experiences of women about the effect of climate change on maternal nutrition during their childbearing years. Furthermore, it supported the researcher in understanding the experiences and knowledge of women associated with the phenomenon under study (Polit & Beck, 2012). Since individual perceptions and experiences vary from person to person, therefore, the proposed design helped gain an in-depth understanding of individuals' experiences.

Study Setting

The present study was carried out in a Category D Hospital, Pashat, (Rural Public Health Center), situated in the village of Pashat, district Bajaur. The hospital is located in a hilly area of Bajaur, where snowfall and seasonal variations badly affect people's lives. The district Bajaur is

roughly 72 km long and 32 km wide and is close to the Kunar Valley, having a continuous range of mountains. The rationale for conducting this study in Bajaur is based on the unique climatic conditions in the region. Bajaur experiences winter from November to May, which is characterized by extremely cold and freezing temperatures, the temperature often falls below the freezing point. Fresh water flows from many springs and streams across the area and is the source of irrigation and drinking water.

Established in 1995, the hospital has 60 beds and a department for Obstetrics and Gynecology, where both inpatients and outpatients are evaluated regularly, here the physicians assess approximately 50 patients daily. The Obstetrics and Gynecology, department comprises several sections including the OPD block, a Gynea ward with approximately 10 beds, a labor room, and a nursery with 4 beds for preterm babies. Patients in the Gynea ward normally stay for an average of 3-5 days, while in the nursery babies are admitted for about 3-4 days. The hospital also provides antenatal and postnatal services along with neonatal vaccine facilities. During the harsh winter season, the proportion of patients visiting the hospital decreases due to the cold weather and transport challenges caused by snowfall. Conversely, in the summer season, the flow of patients seeking healthcare services increases. The indigenous population of the community is rural, many of whom work as woodcutters and laborers. For this study, participants were indigenous childbearing women, who seek healthcare services in the outpatient department of the hospital.

Study Duration

The study was carried out after the Approval from the Ethical Review Committee (ERC) (Appendix C), from 05 May 5 to October 5, 2023.

Sample Size

In a qualitative exploratory descriptive design, the degree of saturation is typically reached when no new information is obtained from study participants, which is considered the most standard sample size determination method in qualitative research (Vasileiou et al., 2018). For this study, an initial anticipation of a sample size ranging from 10 to 12 participants was set, and ultimately, data were collected from a total of 12 participants. This decision was made because, at participant number 11, repetitive information emerged. To ensure thoroughness and rigor, the researcher opted to include one additional participant for data collection.

Sampling Method

The sample for this study was purposely chosen, by using the purposive sampling technique, commonly used in qualitative research to find individuals, who can provide rich and insightful information (Patterson, 2014). The researcher precisely targeted study participants with significant knowledge and experience related to the topic under investigation (Ivankova & Plano Clark, 2018). By using this sampling strategy, the study aimed to collect comprehensive data about the experiences of childbearing women, regarding maternal nutrition, who are affected by the extreme winter season.

Eligibility Criteria

Inclusion Criteria

Study participants were selected via the following inclusion criteria.

- Child-bearing ages Women who have experiences with food insecurity during cold weather.
- Willing to participate and give written consent.

- Who can speak Pashtu or Urdu?

Exclusion criteria

Study participants were selected via the following exclusion criteria.

- Those mothers, who are mentally impaired.
- Or have other severe diseases.
- Not willing to participate.
- Those women who have not given any birth.

Participants Recruitment Process

The recruitment of participants is a systematic process; hence it was carried out done in many steps. First, official written permission was obtained from the District Health Officer (DHO) (Appendix A) of district Bajaur and the Medical Superintendent (MS) (Appendix B) of the Category D Hospital, Pashat, and Bajaur. After the permission an Approval was obtained from the Ethical Review Committee (ERC) (Appendix C) of Aga Khan University. Then the researcher visited the Category D Hospital, Pashat, and arranged a meeting with the Head of the Department to brief them about the nature and purpose of the study, in view of the ethical considerations. The official permission letter and ERC letter were also shared with the Head of the Department. The Head of the department arranged a room for data collection, where lighting facilities were available. The researcher introduced himself to the nursing staff working in the inpatient and outpatient departments of the hospital. The researcher then purposefully selected and recruited participants who had adequate information about the phenomenon, to achieve a level of understanding (Polit & Beck, 2012). After identifying the eligible participants, the researcher introduced himself and explained the purpose of the study. After greetings, the

researcher discussed about their willingness for participation, and those who agreed, were invited to an assigned room, where, there was no disturbances happened. Sine the researcher was male so to establish Pashtun cultural norms and to develop the comfort level for female participants during the interviews, a female nurse was incorporated during the interviewing. The presence of the female nurse during the interview sessions was intended to build a supportive and encouraging environment for the participants. Women who seeking routine checks-ups, at the outpatient department, were recruited. The written informed consent (Appendix D) was also obtained from them, before conducting the interviews. The in-depth interviews were continued until a level of saturation was achieved during data collection. Pseudonyms (fictitious names) were used for all participants to ensure their privacy.

Data Collection Tool

For data collection, a demographic questionnaire and a study guide were developed by the researcher. The demographic and study guide were then translated into Pashtu, the native language of the region, who were fluent in Pashtu. The demographic questionnaire collected information comprising names, gender, age, religion, level of education, occupation, marital status, year of marriage, number of children, total household income, and type of family (Appendix J). The semi-structured interview guide (Appendix G) was developed through a combination of existing literature review, conceptual framework and prior knowledge. It aimed to facilitate comprehensive data collection, allowing participants to provide detailed insights and experiences with maternal nutrition and food insecurity during harsh winters. Probes were used in the interview guide which provided an opportunity for the interviewees to express their feelings and experiences (Polit & Beck, 2019). The semi-structured interview guide structured into four distinct topics.

The first topic was related to "Maternal Dietary Patterns during Pregnancy." Under this topic study participants were asked open-ended questions and probed about the kind of food they consumed during pregnancy and whether they experienced any changes in the timing or quantity of their food intake during the winter season. Moving on to the second topic, "Food Security and Season" the participants were questioned about the best and worst time of the year for maternal nutrition, and whether they faced any difficulties in attaining food during the harsh winter season. Additional probes also investigated the strategies used by the participants to cope with food shortages during the winter season. The third topic, "Food Related to Household Expenses" concentrated on participants' sources of income and how they managed household expenses related to food. Through probes, they were asked about the percentage of household income spent on food and about significant changes in food costs during extremely cold weather. Lastly, the fourth topic, titled "Food Security and Maternal-Infant Health," addressed the relationship between food consumption and pregnancy and its impact on pregnancy outcomes.

Pilot Testing

Performing a pilot test is an important step before initiating actual data collection. It enables a researcher to modify the interview guide for its viability (Ismail et al., 2018). Before the actual data collection, a pilot test was carried out on two study participants. The purpose of pilot testing was to check the reliability and validity of the interview guide. The other purpose was to ensure the relevancy of the study guide and language comprehension. The results of the pilot tests were shared with the supervisor and committee members. Minor changes were suggested in probes and questions. The findings of the pilot tests were not included in the data analysis.

Reflexivity

In the course of conducting this study, the researcher shared the same tribal identity as the interviewer. Both belonging to the rural Bajaur community, the researcher strategically emphasized this shared identity to establish familiarity and rapport with the interviewees. The use of the Pashto language during discussions further aimed to create a comfortable environment for the participants. In instances where language barriers arose, a female nurse assisted in maintaining seamless communication, underscoring the importance of effective understanding during the interview process. The researcher remained open-minded and dependent on the responses and narratives provided by the participants, recognizing the importance of letting the data speak for itself. Growing up in the region exposed the researcher to the harsh winter conditions caused by climate change, including heavy snowfall, rainfalls, and storms. This reflexivity highlights the researcher commitment to understanding the context, being open to diverse perspectives, and acknowledging the potential impact of personal experiences on the research process.

Data Collection Process

After the ERC-AKU approval and hospital permission, data collection was initiated from June 6 to July 10, 2023. Face to face interviews were initiated after obtaining written informed consent. The researcher conducted interviews in Pashtu language to deeply understand the phenomenon, with each interview noted for duration analysis. Audio recordings and field notes were taken to document the data. Privacy and confidentiality were prioritized in a selected room in the OPD Department. Each interview's duration was noted for variation analysis and to determine the average. The interview, lasting 25 to 45 minutes on

average. Data collection process continued until data saturation was achieved, following qualitative research standards (Doyle et al., 2020). The researcher ensured convenience for participants regarding time and location, as suggested by Harrington et al. (2019), Data collection continued until saturation, considered the gold standard for sample size in qualitative research.

Data Analysis

The qualitative data analysis involves the identification of patterns and themes and determining how these theses' theme answered the research question (Creswell 2018). This method involved a series of steps from general to specific which are given below, First, the recording was given a unique identification number (ID) for maintaining the anonymity of the participants. The audio recordings were transcribed into a Word document as text-based data. Non-verbal gestures were also noted to highlight the emphasized points during the interviews. Interviews were transcribed into Pashtu and then translated into the English language by the researcher. The English-translated version was checked by the supervisor and committee members for ensuring accuracy. The researcher listened to the recordings multiple times and read the translation multiple times to ensure that the meaning remained the same as shared during the checking. The researcher read the data multiple times to reflect the meaning, impression, and in-depth understanding of the data. Reflective notes were also written after each interview to reduce any biases. The researcher made five columns in the documents which included transcription, codes, subcategories, categories, and themes. From the narration, ideas with similar meanings were aggregated under the column of codes. Multiple codes emerged from the participant's responses. The researcher interconnects the comparable and similar codes into subcategories and then categories Then similar categories were merged to generate themes that made the data more

understandable. Demographic data was presented in a tabular form. Narrative data were presented from general to specific with the themes and the categories and were supported by the participant's quotes. Data interpretation was done by comparing the findings with the literature, with the help of the thesis supervisor and committee, members.

Study Rigor

Study rigor, in qualitative research, is an essential feature to verify the trustworthiness of the study. There are several criteria for maintaining rigor in qualitative studies, especially "the goodness criteria" by Miles and Huberman (1994) research, "the criteria of trustworthiness" by Lincoln and Guba, and parallel traditional terms (Schwandt, 1997). The current study utilized Lincoln and Guba's criteria of trustworthiness, i.e. credibility, dependability, conformability, and transformability.

Credibility

Credibility, in a qualitative study is to examine the study's true value (Lincoln & Guba, 1985). Prolonged engagement of the researcher with data is also credibility. In the current study, the researcher, he collected all the data. During the data collection, the researcher also encouraged the study participants to share their in-depth experiences by asking open-ended questions and using probes.

Some questions and terms like climate change and maternal health were also explained well in Pashtu language to the participants. Self-reflection was noted were also taken during the interview, to explicitly observe the participant's nonverbal responses. The semi-structured interview guide also helped during the interviews to draw appropriate responses and sample size of the participants, which increased the credibility.

Dependability

Dependability refers to assessing the effectiveness and precision of data collection and analysis. Numerous techniques might increase dependability, including peer review, independent data coding, and dialogue among co-researchers (Polit & Beck, 2019). The data analysis was done twice so that the researcher could assessed how the responses addressed the research questions.

To establish dependability the researcher involved the thesis team in data analysis, seeking their input in developing codes and identifying appropriate themes. Moreover, the committee members also gave rigorous feedback on data analysis. The results of the current study were also compared with the results of other similar studies to establish dependability.

Confirmability

Confirmability is used to determine how well the collected data validate the study's findings. It also refers to the information given by the participants as being fair and without any biases (Miles et al., 2019). That was the researcher checked and rechecked with the committee members throughout the study. The relationship between the collected data and the study results were connected to the reliability component.

In the current study, the confirmability was maintained by sharing and confirming, codes, categories, and themes with the supervisor and committee members for verification. Moreover, besides a detailed methodology, an elaborated analysis of the findings was also provided to facilitate the reader to compare themes and participants' quotations

Transferability

The term “Transferability” refers to how broadly the research's findings can be applied to different contexts and fields (Miles et al., 2019). The methodology of the study has been explained in detail. Moreover, the demographic information of the participants has been presented clearly. The strategy can be helpful for future researchers wanting to replicate this study in any setting.

The finding and results can be considered for other secondary hospitals in the rural northern regions of Bajaur. In conclusion, the detailed procedure of the study has been explained to aid transferability.

Ethical considerations

- Official permission was obtained from the District Health Officer (DHO) of district Bajaur and the Medical superintended (MS) of the Category D Hospital, Pashat, Bajaur.

- After the permission, an approval Referred Appendix D was also obtained from the Ethical Review Committee (ERC) of the Aga Khan University.

- After Official approvals, the researcher approached the concerned department of the Category D hospital, and written informed consent was obtained from the study participants before the data collection.

- The right of not participating or withdrawing at any moment during the study process was also given to each participant.

- In the consent form, it was also mentioned that there was no risk or harm to the participants, but if emotional or psychological distress occurred during the interview, the Researcher would discontinue the interview and provide psychological support, and counseling to the participant.

- For maintaining anonymity, the names of the participants were kept confidential throughout the study period. As a replacement for the names, specific code numbers were allocated.

- The participants were also ensured that their names would not be disclosed in any quotes or publications of the study.

- The researcher also ensured the study participants regarding confidentiality that all the collected data would be kept in a secure place and only the primary researcher and thesis team would have access to it. Furthermore, the data stored in the computer would be secured by using a password. The data would discard as per Aga Khan University's data disposal policy.

Summary

The chapter provided a comprehensive overview of the research methodology, study design, study setting, study population, and eligibility criteria. Additionally, it also covered the sample and sampling technique used in the study as well as the data collection process. The data analysis and study rigor were also discussed in detail, to ensure trustworthiness and study reliability. The ethical considerations undertaken in the study and the plan for disseminating the findings were also outlined in the final section of the chapter.

Chapter Four: Results

The chapter presents findings from the analysis of experiences of rural indigenous women related to food insecurity and maternal nutrition, in the context of climate change (extreme winter), at Category D Hospital Pashat, Bajaur, KPK, Pakistan. The chapter begins by providing an overview of the demographic characteristics of the study participants. Subsequently, it presents a detailed explanation of the content analysis method as outlined by Creswell. The data analysis includes participant quotations, precisely organized under themes and categories. Finally, the chapter concludes with a brief summary, providing an overview of the key findings and understandings derived from the content analysis process.

Demographic characteristics of the study participants.

The study included 12 participants comprised of rural childbearing-age mothers, who were housewives and belonged to the hilly area of Bajaur. Among the participants, 83.3% had no formal education and only 17.7% had received primary education. Moreover, 91.6% were married, while 8.4% were widowed. The number of years that 50% of the participants had been married was 6-11 years, 33.3% had been married for 18-23 years, 8.4% for 12-17 years, and 8.4% for 1-5 years. All participants were Muslim. Furthermore, 50.0% of participants had 1-4 children and 50.0% of participants had children 5-6. The mean household income of the participants was RS 16,000 PKR per month. Most participants (75%) lived in a joint family system, while 25% lived in a single-family system. The overall descriptive analysis of the demographic data is presented in Table.

Table 2 Socio-demographic variables of study participants (n=12)

Variables	Groups	Frequency	Percentages
Gender	Female	12	100%
Age in years	18 - 25	3	25.0%
	26 - 40	6	50.0%
	41 - 60	3	25.0%
Educational Status	No Formal Education	10	83.3%
	Primary education	2	17.7%
Occupation	Housewife	12	100.0%
Marital Status	Married	11	91.6%
	Widow	1	8.4%
Year of Marriage	1-5 year	1	8.4%
	6-11 years	6	50.0%
	12-17 years	1	8.4%
	18-23 years	4	33.3%
Number Of Children	1-4	6	50.0%
	5-9	6	50.0%
Household Income:	Below 15,000	6	50.0%
	16,000-25,000	6	50.0%
Type of Family	Single-family	3	25.0%
	Joint Family	9	75.0%
Total		12	100%

Content Analysis of Participant's Interviews

The data analysis was carried out manually, based on the guidelines of Creswell's (2018) criteria for qualitative Content analysis which comprises five main steps. The first step was data organization of the available information collected through in-depth interviews and field notes. Initially, each participant was assigned an ID number, which was used during the interview to maintain anonymity. Next, all the interviews were transcribed in Pashtu, then translated into English and kept as text-based data in a Word document. The translation was divided into five columns, which included identification of participants, Transcription, codes, categories, and themes. Every transcription was read multiple times to identify and understand the key concepts. In the translation, data with similar meanings were combined and written under a common code. Subsequently, similar codes were merged to form categories and each category was supported by the related quotes of the study participants from the transcription. Finally, similar categories were merged into themes (Table 2).

A total of four themes emerged in the study, that were pertinent to the study questions: Impact of Climate Change on Food Security and Navigating Strategies, Climatic Impact on Maternal Health, Pregnancy Outcomes, and Infant Well-being, Effect of Climate Change on Household Food Expenditures and Dietary Patterns and their Significance during Pregnancy.

Table 3 Content Analysis of Participant Interviews

Themes	**Categories**
Impact of Climate Change on Food Security and navigating Strategies	• Optimal Nutrition during spring and Summer Seasons. • Challenges in Maternal Nutrition during Winter Seasons. • Strategies for Navigating Food Scarcity in Winter pregnancy

Climatic Impact on Maternal Health, Pregnancy Outcomes, and Infant Well-being	• Maternal Health and Nutrition: Exploring Connections • Nutrition's Role in Pregnancy Outcomes • Comparing Generations: Maternal and Infant Health Trends
Effect of Climate Change on Household Food Expenditures	• Sustainable Food Management Strategies • Seasonal Impact on Food Expenses.
Dietary Patterns and their Significance during Pregnancy.	• Pregnancy Nutrition: Diet, Preferences, and Critical Nutritional Periods. • Indigenous Specialized Dietary Considerations and Food Timings.

Theme 1: Impact of Climate Change on Food Security and Navigating Strategies

This theme investigates how climate changes cause extreme weather conditions that affect food security, particularly among indigenous mothers in rural Bajaur. Many participants highlighted that extreme winters often lead to a shortage of food and vegetables. To counter this challenge, mothers employ strategies like drying and preserving food for future use. As spring and summer arrive, the situation tends to improve. During these seasons, fresh vegetables become available, and the difficulties related to food scarcity decrease. Participants claimed that this period of the year generally contributes to better health outcomes for the community. To understand the impact of climate change on food security, the theme categorized into three categories; challenges in maternal nutrition during winter season, Strategies for navigating food scarcity in winter Pregnancy and optimal nutrition during the spring and summer seasons.

Category 1: Challenges in Maternal Nutrition during the Winter Season. This category focuses on seasons that present obstacles to maintaining proper maternal nutrition, particularly in winter. The majority of participants highlighted the scarcity of fresh vegetables, fruits, and even milk during this season. They also mentioned that in extremely cold winters, they had to fetch water from a well, located near their homes. This is because the pipes carrying water from the mountains get blocked by snow and freeze due to the extremely cold temperatures.

Additionally, it has been observed that lifting heavy water containers can also lead to miscarriages. The cold morning household activities cause their hands to freeze, and in order to counter this, they need to start a fire. This difficult situation in winter affects both their access to basic necessities and their health, highlighting the challenges they face during this season. One mother stated;

> I think winter is the worst for mothers because in winter there are no vegetables, no fresh fruits. Milk is also not available anywhere. In winter we do not have fresh water. We bring water from the well, lower on the hill, which is far below our house. In this Freezing cold *(Sakhta Yakhni),* we bring this on our heads. (ID-05)

Several mothers mentioned that the winter season brings challenges, such as snow and rain, which leads to closed markets and disrupted transportation. This makes it difficult for them to reach health centers when needed. One participant mentioned, “We carry water utensils on the head, it may cause miscarriages *(zayaegy)* and preterm baby”. One major issue that they face is the scarcity of fresh vegetables and fruits in the market. Often, only a few food items like onions and potatoes, are available in markets. These limited vegetables are also quite expensive. As a result, they end up relying on dried and preserved foods for the winter. One participant stated,

“Drying onions and garlic is a common practice, but these foods do not taste as good as fresh ones” (ID 04). Another participant verbalized the problems in these words;

> The harder time in the year is extreme winter when there is heavy snowfall and rainfall for weeks, our males cannot go to the markets. In heavy snowfall, many roads, streets, and bazaars are closed. We face troubles in getting transport during these days. At times, old vegetables and fruits are available, but even when available that is very high Few types of vegetables are available these days like onion tomatoes, and potatoes. These are also very expensive these days. We cannot buy them. We generally prefer homemade dried and preserved onions and tomatoes (ID-01).

They further added that vegetables also became really expensive during this time. Prices of tomatoes can cost Rs 200 (1 USD) per kilo, which is just not affordable for them. So, they often resort to making a simple dish called "salan," which is made with dried tomatoes, water, and salt. The grass for their livestock also becomes short in the snowy season, as a result, they do not produce milk. They also mentioned that cold winter affects their skin appearance, and engaging in household activities in such conditions damages their skin even more. Hence**,** if someone becomes pregnant during such harsh winters, it can be really tough. The women said that they trying to avoid getting pregnant during winter, but unfortunately, they often do not succeed. As their husbands also lack education about family planning.

Newborns can also be affected badly in harsh winter, sometimes resulting in stillbirth or premature births due to the cold. Moreover, children have limited or no milk due to its unavailability. Also, the children cannot even bathe comfortably because the water is so cold. Finding warm water even for basic tasks, like ablution, becomes a challenge. Moreover, in the

rainy season, it is difficult to find dry wood for a fire, which affects their ability to keep warm. One participant stated;

> In harsh winter, the biggest challenges are heavy snow and persistent rain, causing leaks in our wooden roofs. We invest in plastic to protect our homes in heavy rains. Consequently, with these expenses, we have to less spend on costly food. We resort to simple meals like salan with bread or plain white rice with potatoes, leading to weakened health for us, and our livestock is affected, as they cannot graze on the hills. (ID-02)

Category 2: Strategies for Navigating Food Scarcity in Winter Pregnancy. This category addresses strategies that women employ when facing food scarcity in harsh snowy winters. It explores adaptive capacity approaches used by these indigenous rural women to compensate for the unavailability of food during winter pregnancy. Some participants mentioned that their older mothers are quite skilled in the art of drying vegetables and foods due to their years of experience. They explained that they dry vegetables like lady's finger (*Bandai*) to prepare for the harsh winter. Additionally, they make sure that they store desi ghee (clarified butter) for the winter months. A helpful strategy that they use is to put the desi ghee on a special dish called "Lawand." Elder women prepare this special dish for pregnant women to support their pregnancy and meet their nutritional needs. This tradition is rooted in the belief that the dish will provide essential nutrients. One mother shared her experience in these words:

> My mother-in-law is quite an expert in drying food for winter. She preserved last year's *Bandai* (lady's fingers) and *karela* (bitter gourd). She kept four bags of Bandai for winter. Then some of our relatives also gave us some other things in return, we also kept dried onions for winter. Dry onions are used for a special *salan* called *Lawand* made from

Lassi and rice, then We put *Socha Ghwaree* on this dish we also use this in making simple rice with *mahu dall* (a kind of pulse) in winter. (ID-02)

Some mothers while explaining their winter food strategy for winter pregnancies, mentioned making maize flour Halwa (laity) and potato salan (a dish cooked in a spiced sauce), along with rice and bread. Some mothers also expressed that in winter they consumed more black tea in winter. Utilizing potato salan more often is common, depending on their financial circumstances. One participant stated *"*In winter we use more black tea. Our children just drink this warm tea again and again with simple maize bread. The black tea is just like warm water and did not contain any nutrients. (ID-09)

Category 3: Optimal Nutrition during the Spring and Summer Seasons. This category explores the seasons that provide better access to food sources. It investigates why certain times of the year are more favorable for obtaining nutritious foods and considers the factors that make this easier. The majority of the participants expressed that the spring and summer seasons are the most beneficial times for them due to the availability of fresh vegetables and fruits which are easily accessible for purchase. Local vegetables cultivated in the area are also readily available in local markets. Some participants also mentioned that grass becomes abundant during this season, providing food for the cattle. Fields and mountains are filled with grass for cattle. This abundance of grass contributes to the well-being of the cattle, which in turn produces more milk for consumption. This milk is then used to create products like Mastha, Lassi, and butter. Several indigenous mothers highlighted, their strong reliance on locally available vegetables and domestic dairy products. They mostly consumed foods that originated from the land in the village rather than opting for items available in the market. One mother explained;

> Spring is the best time for us when everything flourishes. Flowers and plants bloom, and fresh vegetables abound. Our relatives grow cauliflower, turnip, onion, and tomatoes during the summer season and generously share with us. They also provide grass for our cattle, particularly our two sheep that produce milk in spring. Our children also enjoy milk tea during this time, and the fields are lush with grass, ensuring our livestock's health. Occasionally, we also sell calf in summer, as this makes a little help in income. (ID-04)

Most of the mothers also shared that the spring is nice, and their children also stay well in these seasons. The sun is out, which makes them feel good, especially after the cloudy weeks of winter that can affect their health. During spring, their mental health is better too. They do not feel as stressed as they do in winter. Everything related to food is good during summer and spring.

A few mothers also pointed out that spring was like a food season for them. It is a time when getting food is not so hard. Snow and rain do not block the roads, so there are no obstacles. During this season, even children sell items on small carts by the roadside, and these things are affordable and easy to find. One participant stated “There are no such difficulties in getting food products in the spring season. Everything is in excess and available everywhere. Sometimes children are selling lady fingers *(bendy)* hand trolleys in streets at a low cost” (ID-01).

Theme 2: Impact on Maternal Health, Pregnancy Outcomes, and Infant Well-being

This theme explored how climate change affects the mother's health, the health of their babies, and the outcomes of pregnancy. The researcher started with general questions about how extreme weather conditions caused by climate change affect maternal health and pregnancy outcomes during harsh winter. It became evident that during cold weather, there is an increase in

premature births and stillbirths, mainly because mothers do not get enough nutrition during pregnancy in heavy snow and freezing temperatures.

To understand this better, the theme is divided into three categories maternal health and nutrition, exploring connection; the role of nutrition in pregnancy outcomes, comparing generations, and maternal and infant health trends.

Category 1: Maternal Health and Nutrition: Exploring Connections. In this category, the researcher investigated the connection between a mother's well-being and her dietary pattern. By examining this link, the researcher gained deeper insights into the vital nutrition role in promoting a mother's health.

A majority of mothers expressed that maintaining good nutrition, especially during spring and summer when food is more available, leads to better health outcomes. In contrast, when nutrition is neglected during winter, their health gets compromised. This weakened health makes them more susceptible to illnesses like flu and cough. The breastfeeding ability is also affected during this time and even their babies can experience health issues, particularly chest problems. Moreover, they stated that during their first pregnancies, they were more attentive towards their health and diet, but as they became more concerned with subsequent experiences in pregnancy, they began to overlook these factors.

Unfortunately, this neglect has weakened their health over the years. They begin to notice a decrease in their weight and find it challenging to carry out regular household tasks. Medical doctors often tell them that their blood levels are low when they visit hospitals and prescribe medication to address blood-related concerns. One of the participants shared;

> Yes, if we are taking good nutrition then our bodies remain healthy then we can do household activities easily. Then our health also remains good for babies. Mothers with good nutrition have more milk to breastfeed for their babies. Mothers and babies also do not suffer from infections. Then, babies grow fast and are active all the time. If mothers do not eat good food, they remain sick. Their children also remain underweight and sick all the time. (ID-01)

It is evident from several participants that babies born during the winter season tend to be weaker and more susceptible to illnesses. This vulnerability to infections is attributed to the lack of nutritious food available for mothers during the cold months. During the winter, their dietary preferences often lean towards simple choices like tea and bread. Unfortunately, these options lack the necessary energy and nutrients. This factor, in turn, directly influences maternal health. As one participant stated,

> Good nutrition ensures maternal health, strength, and immunity from illnesses. I observed this firsthand with my first two healthy children, born when I had proper nutrition during pregnancy. However, during my third pregnancy, stress and family issues prevented me from eating well, resulting in a difficult pregnancy and a weak, sickly daughter. Nutrition matters, as it greatly affects our children's health and well-being. (ID-02)

Another participant shared “Good nutrition, including Socha Ghwaree, eggs, Mastha, and bread, can keep mothers healthy and active. Without it, mothers become frequently weak and sick”. (ID-04)

Category 2: Nutrition's Role in Pregnancy Outcomes. This category focused on the important periods of pregnancy and how nutrition can impact the outcomes. The category also explores how the dietary choices of indigenous mothers' impact diverse aspects of pregnancy, from the occurrence of maternal infections to the birth weight of newborns. Most of the participants mentioned that food plays a significant role in influencing their pregnancy outcomes. Adopting a nutritious diet not only promotes good maternal health but also contributes to the well-being of our babies.

It was evident from participants' narrations that there is a clear correlation between a healthy diet and positive maternal health, which in turn leads to healthier babies. One of the participants narrated that her sisters-in-law avoided proper nutrition during pregnancy has resulted in weakened health and a lean physique. Regrettably, her children also suffer from similar health issues, necessitating frequent visits to the hospital for medical attention. Moreover, their previous children exhibit better health due to the good nutrition that they received during their pregnancies. However, the recent challenges that they face with regard to the unavailability of food in winter have impacted the health of their children. One of the participants shared that a nourishing diet during pregnancy contributes to the well-being of both mothers and their children.

One of the participants shared

> Yes, food can affect pregnancy too. If we take good food and *(Socha Ghwaree)* we will be healthy, our baby will also be healthy, and babies will not have any infections *(Jaraseem).* Babies will grow fast after birth. My sister-in-law is not taking food; she cannot eat (*Socha Ghwaree),* and she said I cannot bear heavy food like this. Then the

> two daughters are so thin like their mothers that we have to take them to the hospital due to their illness. Their babies have jaraseem (infection). (ID-04)

The consensus among many mothers is that those who maintain a well-balanced diet during their pregnancies tend to experience safe deliveries at home, often without the need for hospital visits. A good diet contributes to their physical strength during pregnancy, resulting in healthy babies with adequate weight.

One participant shared a personal experience from the previous year when she was diagnosed with hypertension. The doctor advised her to avoid salty and oily foods, including meat and rice. This change in her diet during pregnancy led her to rely on tea and bread. Unfortunately, this restricted diet weakened her overall health, which in turn affected her baby's health. She gave birth prematurely to a baby with a very low birth weight, as her diet was inadequate. Her blood pressure remained high, further complicating matters. She said that the repercussions of this nutritional imbalance are evident even now, as her two-year-old child continues to struggle with weak health. This personal description serves as a glaring example of how maternal diet greatly influences both the mother's well-being and the health of the newborn. Adequate nutrition during pregnancy is crucial for not only the mother's health but also the healthy development of the baby. One participant said,

> Nutrition affects pregnancy outcomes directly, if we eat more in pregnancy then our children will be healthier and strong, if we eat less in pregnancy, our children will be weak and unhealthy. In my first pregnancy, I ate well then my first child was born healthy, In the third due to tension, and home conflicts, I could not eat well, and then my daughter was born she was ill all the time and was weak. Some women have miscarriage

lose their pregnancies when they do not eat well and some women birth to preterm babies". (ID-02)

One more participant explained, "In winter there is the problem of food availability then our pregnancy becomes affected. Birth in this season is so unlucky. In winter mothers have no milk (breast milk) for babies. Because food is not available" (ID-06).

Category 3: Comparing Generations: Maternal and Infant Health Trends. This category explored how the health of mothers and infants has changed over the past years. The researcher wants to study whether today's mothers and babies are healthier than those in the past. This is expected to help in carefully studying the changes in health patterns and to figure out if there are any differences. The majority of the participants believed that presently, many mothers find themselves in a state of sickness and weakness, manifested by lower body weight and height. This stands in contrast to the past when mothers were strong and healthy. In earlier times, mothers were actively engaged in various activities, alongside their husbands in the fields. Their diets included pure milk, desi ghee, and white rice. They avoided impurities in their diets, things like cold drinks, coffee, and tea. The stamina of past mothers was apparent in their readiness to climb mountains to gather wood. Sadly, the situation has changed drastically now. Modern-day mothers struggle with fragility and are often unable to carry out regular household tasks due to their weakened health. The transformation in climate, marked by increased rainfall and snowfall, has intensely impacted health and nutrition, contributing to the current state of mothers' well-being. One mother shared,

Nowadays, mothers are sick and weak, they have less weight and height. In the past mothers were very strong and had good height and weight. The reason for this is that in the past mothers used pure food. They used pure things in their homemade food products. They used

Desi Ghee (Socha Ghwaree) and pure milk. Nowadays mothers use impure products in food. They do not prefer milk. There are impurities in sugar, black tea, and masala. Nowadays, extreme winters and extreme summers also affect mothers' health. In the past, there was no such heavy snowfall in winter. Past mothers would climb mountains for woods in winter" (ID-01)

Another participant said, "Past mothers were healthier than us, their minds were also better than us. They were strong and they had better ideas than us. Although I am young, I have vision problems" (ID-06). Another participant added "My mother is older than me but she does not have such problems. My mother has every skill like She can make tandoor, and cot (charpai), and like blanket *(barastani),* she is active all the time while we are ill the time" ID-02.

One more participant shared *"*Past mothers were active all the time they went to the top of mountains and hills they brought water from far-flung areas. They also brought wood. They never caused even fever and infection" ID-03. This difference in the health of past and current mothers possibly due to the food insecurity caused by extreme weather conditions noticed in the decades.

The majority of the participants also mentioned that current children often seemed to be less healthy, suffering from frequent infections, being underweight, and not growing properly. This is quite different from the past when children were strong and actively helped their parents with work in the fields and at home. In the past, children hardly ever went to the hospital because they were usually quite healthy. But things have changed significantly now, modern children often face health problems, including infections like COVID-19 and even cancer, which were not as common in the past. The first-born children from earlier generations were especially healthy and robust. Unfortunately, recently-born children seem to have more chest problems. Additionally, many girls today suffer from issues like anemia, being underweight, and not

getting the right nutrition. This comparison between the past and present highlights the stark disparities in the health and well-being of children, underlining the challenges they face in terms of infections, health issues, and overall growth. One participant stated;

> Nowadays, children are also ill, they all the time they have infections and low weight, while past babies had good weight. Nowadays babies have chest problems, and people seem to become weak day by day. My father-in-law is old but he can work more than a younger one. Nowadays children are not so strong. My first child was so strong (healthy) and my brother was also strong and healthy even though we could not take him to the hospital for years. Now my daughter and my brother's sons are ill all the time with constant low blood (anemic) daily, and every child has chest problems due to a cold. They have low weight and may be weak suffering (malnutrition). This change might be due to having winter for many months (climate change) (heavy snowfall)" (ID-02)

Similarly, another participant verbalized

> Like mothers, past babies were also healthier than current ones. Children in the past climbed trees, played in the mountains, and worked with their parents from very early ages. They were stronger nowadays our children are mostly sick, weak and yellow. They have chest and abdominal problems. (ID-07)

One more participant shared "Nowadays all babies are sick and weak, due to mothers not breastfeeding their children for one year. Therefore, their babies mostly have chest problems and diarrhea problems" (ID-08)

Lastly, one more participant said "In winter there is no facility, no gas, no electricity, hence a baby born in summer remains healthier than those born in winter. In summer there is access to food, and the mothers and babies both remain healthy" (ID-01)

Investigating these three interesting categories, enriched our understanding of how nutrition plays a significant role in maternal health, pregnancy outcomes, and the healthy well-being of infants.

Theme 3: Effect of Climate Change on Household Food Expenditures

In this theme, the researcher revealed the association between climate conditions and household expenses. During the winter season, characterized by heavy snow and rain, food becomes scarce and more costly due to limited availability. This situation poses a significant challenge to the community, making it difficult to access adequate food supply. Most mothers also highlighted that their food purchasing patterns are influenced by the changing seasons. During winter, they face challenges of scarcity and limited access to markets due to snowfall and rain, leading to fewer visits. Sometimes, market closures occur because of weather conditions.

Conversely, during the summer and spring months, obtaining food is easier. This allows the community to purchase fresh and less expensive foods. This direct difference between winter and summer shows the considerable impact of seasonal fluctuations on both the affordability of food and availability. To gain a deeper understanding of this phenomenon, the theme is further divided into two distinct categories and sheds light on the dynamics that shape how households manage their food-related expenses.

Category 1: Climatic Impact on Food Expenses. This category highlighted how the cost of food changes with extreme weather conditions. The prices and availability of food fluctuate during different times of the year, which reveals how these seasonal shifts affect how households' food expenses. Many mothers mentioned that their family's income was directly related to the climatic changes. In the summer and spring, Schools and colleges also run as usual

the men work also in the market and earn money. However, when winter arrives, things change dramatically. Everything stops; schools and colleges close for about three months, and the roads and markets become unreachable because of snow and bad weather. The women stated that in winter their husbands often cannot find work and, hence, are unable to earn an income. This has a direct impact on their financial situation. Additionally, the livestock's condition is affected during this time. Cattle become weak, and it becomes challenging to sell them. Even hens stop laying eggs, which further impacts our potential earnings. One mother added, “Yes, our income is related to seasons, in winter there is no business, and markets are closed for months. Our income decreases in winter due to rain and snow” ID-07. Similarly, another participant shared: “Yes, definitely the cost of food rises in the cold weather, and vegetables, like Bandai, and taper karela are unavailable in winter. Mostly we use dried ones” (ID-08).

Hence, it was revealed that there is a significant fluctuation both in income and in food expenses, particularly during the winter season. Prices for essential items like sugar, flour, rice, and vegetables tend to rise, making it difficult for economically disadvantaged people to afford these increased costs. During winter, the variety of available foods becomes limited, with only a few vegetables like tomatoes, onions, and potatoes available. Balancing the food budget during winter becomes a struggle, and saving becomes nearly impossible.

Conversely, summer brings some relief as acquiring food becomes somewhat easier, and income also improves. This allows them to purchase fresh and less expensive foods. This stark difference between winter and summer showcases the considerable impact of seasonal fluctuations on both the affordability of food and their ability to meet their nutritional needs. One mother shared:

Yes, there is a big fluctuation in our income, my husband is not earning in the cold season, because he stops working in the cold and rain. No one can work when there is snowfall. Expenses on food become high, sugar prices, flour rice, and vegetable prices become high in the cold. We cannot purchase food because we cannot afford it. Rich people can buy. We bear hardships, but what we face is from Allah's side. Allah makes it easy for us. (ID-04)

As stated by another participant: “We are confined inside rooms for months, our cattle become weak. Our hens cannot lay eggs. If we are pregnant in this season our pregnancy is affected, we mostly deliver before time” (ID-02).

Most mothers also highlighted that their food purchasing patterns are influenced by the changing seasons. During winter, they face challenges of scarcity and have limited access to markets due to snowfall and rain, leading to fewer visits. Sometimes, market closures occur because of weather conditions. Moreover, the cost of food tends to rise in winter, making it difficult for them to afford.

Conversely, summer brings an abundance of fresh vegetables and fruits, often locally grown in nearby villages. This encourages more frequent market visits for purchasing these seasonal items. Improved health is often observed during the summer months due to the availability of nutritious foods. As one participant verbalized, *“*In the summer season we buy more often because roads are open and secondly vegetables are in excess and are less expensive” (ID-02). This comparison between winter and summer shows the profound impact of changing seasons on their daily lives, food choices, and the ease of access to fresh and affordable foods. One participant verbalized, “We frequently buy food in summer and spring, but in winter, due to high costs and limited availability, we rarely do so. Instead, we depend on homemade dried foods (ID-07).

Category 2: Sustainable Food Management Strategies. This category investigated how households manage their income to meet their dietary needs, unveiling the financial strategies they employ. It also explored how individuals effectively handled their food-related finances, ensuring a balanced budget that adapts to seasonal changes. Many mothers revealed that they allocated their entire income to food, given its scarcity and their limited earnings. Some mentioned that they engaged in raising domestic sheep and hens, which offered a modest contribution to their food expenses. Others shared that they adjusted their food purchases according to their daily earnings.

A significant portion of their budget goes towards purchasing tea, rice, wheat, ghee, and vegetables. Meat and chicken are considered luxuries, often beyond their financial reach. Simple foods are preferred, and some mothers highlighted a preference for homegrown vegetables such as pumpkin and bitter gourd. To save on costs, many prefer homemade food items over those found in the market. One participant shared: “We are spending all the amount, that we earn on food because my father is just earning wages and when he does brings food on that day” (ID-02).

Similarly, another participant verbalized “As I am a widow, my father supports me. We also raise and breed domestic sheep and hens in our home. By selling lamb and young sheep, we generate a little bit of income” (ID-01).

However, winter presents challenges, as food prices soar. In such situations, some families resort to borrowing from relatives or taking loans to ensure they can afford essential food items. As one of them shared, “We are spending all of our income on food because we are having difficulty managing with this income” (ID-01).

Theme 4: Dietary Patterns and Their Significance during Pregnancy

In this theme, the researcher explored the significance of diet during pregnancy and women's diet preferences. The researcher asked different questions to know whether pregnant women changed or adjusted their diets during pregnancy. He also inquired whether the amount of food they consumed changed compared to when they were not pregnant. Additionally, the researcher also wanted to explore how pregnant women perceived the significance of food during pregnancy. To gain a deeper understanding of the topic, the theme is divided into two major categories Pregnancy Nutrition: Diet Preferences and Critical Nutritional Periods, and Indigenous Specialized Dietary Considerations, and Food Timings.

Category 1: Pregnancy Nutrition: Diet, Preferences, and Critical Nutritional Periods. This category explored the varieties of food consumed by women during their pregnancy. It and spring seasons. Many participants explained that during pregnancy, the body needs extra nourishment because it sustains two lives: the baby and the mother. They further added that our specific foods during pregnancy include milk-based items like *(Socha Ghwaree),* homegrown eggs (*Aslee Andee*), Bandai, homemade chicken cooked in (*Socha Ghee*), and ghee with white rice. Additionally, some mothers preferred wheat Halwa made with Socha Ghee, especially after giving birth. Some mothers also stated that in the early stages of pregnancy, particularly during the first four months, they couldn't eat as much due to feelings of nausea and vomiting. However, they did not fully understand why this occurred in the first four months. One mother shared; “In the first four months, we cannot eat much food because in these months we cannot digest food, if we eat more, then nausea and vomiting get aggravated”.(ID-02)

The category also inspects when dietary choices have the most significant impact during pregnancy, particularly focusing on which trimester food intake matters the most and the reasons behind this timing. Many participants agreed that the last two months of pregnancy are crucial.

This is because, during this time, the baby has fully developed and relies entirely on the mother's blood for nourishment. If the mother eats well, her blood will be rich in nutrients, which is essential for the baby's growth.

One participant mentioned, “Food matters in the last two months because, in these months, the baby is fully developed and growing, it needs energy from our blood. If we eat more food our baby and our health will remain good”. (IDI 02)

In this last month of pregnancy, the participants preferred to eat some domestic food which is mostly available in their homes and contains more energy foods. As one participant added “We eat special food like domestic eggs, milk, and *(Socha Ghwaree)* which is special if we do not have our family members will buy for us” (IDI 03).

Another participant mentioned that these last months are especially vital as the baby gains weight and needs more energy. To support both the baby's and the mother's health, it's important to eat more during this period.

> I think in the last four months (trimester) because the weight of the baby increased in the last four months and the baby needs more food that’s why the mother needs to eat more than the routine food intake. This food will help her to remain healthy during pregnancy and will make more blood in the body (ID -05).

However, there's a challenge during the last three months of pregnancy, especially in winter. A few Participants expressed difficulty in finding enough quality food during the cold season. Winter brings a scarcity of fresh vegetables and fruits, making it hard to maintain a healthy diet. Moreover, Mothers tend to focus on taking care of their families and household tasks rather than their own health during this time. As one mother said,

> In the last three months, we need to eat more but in winter, as you know there is a lot of food problem, No vegetables and no sufficient quality food which affects the pregnancy in winter, so We try not to have a pregnancy in winter but we cannot do that (ID-11*).*

Category 2: Indigenous Specialized Dietary Considerations and Food Timings. This category covers the adoption of specific foods and dietary practices among mothers, focusing on the reasons behind these choices, including cultural beliefs, nutritional needs, and potential health benefits. Most of the participants belonged to poor families, and in the winter season, they became dependent on indigenous specialized food, particularly milk-based products and dried vegetables. In the challenging winter season, obtaining food from the market becomes problematic and it is often unavailable due to snowfall and rain, As a result, they rely on domestic food products. These food items were traditional rural foods known for their high energy content and purity. One participant shared, "We eat special food like desi cow ghee homemade clarified butter *(Socha Ghwaree)* homemade yogurt *(Mastha)* hen eggs, cocks, wheat flour Deserts (Atta ka Halwa), Makke (Maize) roti for breakfast" (ID-01).Due to financial constraints within their joint families, where resources were limited, the participants favored milk-related products such as Lassi, butter, and curd. These items were readily available in their homes. As one participant explained, "We are eight member Poor families, cannot afford market food costs, we hardly manage the food-related expenses. We eat simple food in pregnancy, which is routinely available" (ID-08).

The category also includes changes in food intake, and its quantity throughout pregnancy as compared to the non-pregnant times. It also explores whether dietary habits vary across different stages of pregnancy, and the factors contributing to these changes. The majority of the

mothers shared a trend of an increase in their consumption of food during pregnancy, in comparison to non-pregnant times. They also mentioned that pregnancy frequently led to an increase in the number of meal times causing irregularity in eating patterns. As one participant elaborated “Yes, we consume greater amount of food, especially in the last trimester, while in the first trimester nausea and vomiting are common, due to which we cannot eat and drink more”(ID 01).

Several participants noted a doubling of their food intake during pregnancy, accompanied by an increase in meal frequency. As another participant elaborated, “Once we are pregnant, our appetite increases, and we tend to eat larger meals. Our eating frequency also shifts from about two times a day to more than five times daily” (ID 02).

Summary of the chapter:

The findings revealed four major themes: (i) Impact of climate change on food security and navigating strategies ii) Climatic impact on maternal health, pregnancy outcomes, and infant well-being iii) Effect of climate change on household food expenditures iv) Dietary patterns and their significance during pregnancy. The findings also established that the study participants experienced maternal malnutrition and food insecurity, which subsequently increased the risk of preterm births and stillbirths during severe winters. Additionally, children also grappled with malnutrition issues in the winter months due to the scarcity of fruits and vegetables in snowy conditions.

Chapter Five: Discussion

The chapter discusses the findings of the study based on the experiences of childbearing-age mothers regarding maternal nutrition in the context of climate change (cold weather) in rural Bajaur. The chapter is classified into four sections. In the first section, the key findings of each theme are discussed. The second section presents the climate change risk model and how it is integrated into the study context. The third section explains the strengths, and limitations of the study and provides recommendations based on the study findings. The last section includes with the conclusion section and a summary of the chapter.

Nutritional Status of women due to climate change

The findings under this theme explored the significance of diet during pregnancy and women diet preferences. The key findings highlighted dietary choices, varieties of food consumption in pregnancy, nutritional needs, and the impact of cultural preferences on diet during pregnancy. The majority of the participants stated that in the challenging extreme winter season, obtaining food from the market became problematic and was unavailable due to heavy snowfall and rainfall. That is why they mostly preferred traditional indigenous specialized food items. These rural foods are known for their high energy content and purity and are readily available in their homes. These key findings are congruent with a prospective cohort study conducted in Norway, that included 66,000 pregnant women. They assessed three dietary patterns; “prudent” (rich in vegetables, fruits, whole grains, etc.), “Western” (comprising snacks, processed meat, etc.), and “traditional” (including potatoes and fish). High adherence to the "prudent" or "traditional" patterns was associated with reduced preterm delivery risk. These findings, though not establishing causality, highlight the importance of balanced diets during pregnancy, emphasizing the importance of vegetables, fruits, whole grains, and fish, as well as

drinking water. However, decreasing processed and fast-food intake helps in preventing preterm delivery (Englund-Ögge et al., 2014).

Moreover, Koehler, 2016 also reported similar findings that women suffered more from nutritional deficiencies like malnutrition and anemia because of food insecurity issues (Moradi et al., 2018). The majority of the participants went to the top of mountains and hills they brought wood from far-flung areas and brought water from the nearby well. Likewise, Desai & Zhang 2021 also revealed that women living in rural areas face a higher risk of vector-borne diseases since they often need to collect water from wells, and ponds located nearby (Desai & Zhang, 2021).

Furthermore, several participants pointed out that our nutrition often becomes compromised during the winter, leading to weakened health and an increased risk of babies being born with congenital anomalies or experiencing seizures. Additionally, the freezing temperatures can affect our ability to breastfeed effectively. This finding is reported by a study conducted by Batiz et al 2022, which revealed that climate change can also affect birth outcomes and infant health. The key findings also showed that exposure to extreme cold temperatures during pregnancy can lead to more birth defects in different parts of the world with varying climates (Ha, 2022) (Bátiz et al., 2022).

Furthermore, the findings of the study are supported by a chapter published by Rasul and his team in 2019 from Pakistan on Food and nutrition insecurity in the Hindu Kush Himalaya (HKH) region. The key findings revealed that food insecurity affecting over 30% of the population. Approximately 50% of the people in this region experience various forms of malnutrition, with women and children being particularly vulnerable. The problem is more pronounced in remote mountainous areas, where unique challenges like inaccessibility,

environmental fragility, seasonal variations, limited economic prospects, restricted market access, and harsh natural conditions contribute to food insecurity, setting it apart from the challenges faced in the plains (Wester, 2019).

Additionally, many study participants revealed that in the first four months of pregnancy, they could not eat enough due to feelings of nausea and vomiting. At the same time, they didn't understand why this occurred in the first four months. However, some participants mentioned that they are preoccupied with household activities and have no time to eat adequately. During the last month of pregnancy, they tend to consume slightly more food than usual. These study findings are parallel with the findings of a national survey of women in the United States in March 2021, who were either pregnant or within two years postpartum. Out of the 587 eligible women in the survey, it was noticed that many of them made changes to their diets, while others maintained their usual eating habits. Interestingly, most women (84.9%) did not attempt to try specific diets during pregnancy, and a significant proportion (60.1 to 65.9%) were not interested in doing so. Some common concerns included fears about not having a balanced diet, difficulties in following specific diets without family support, and worries about the cost involved. The study underscores the importance of tailoring care to meet the unique dietary needs, characteristics, and dietary patterns of pregnant and postpartum women (Kebbe et al., 2021).

Many participants agreed that the last two months of pregnancy are crucial, because, the baby has relied entirely on the mother's blood for nourishment. If the mother eats well, her blood will be rich in nutrients, which is essential for the baby's growth. Some participants also experienced miscarriages and preterm babies due to neglected proper nutrition in the last months of pregnancy. This finding is consistent with another prospective study carried out in Brazilian municipality, from 2012 to 2014, which included 353 pregnant women. The primary objective

was to identify dietary patterns among these pregnant women and explore the associations between these patterns and various maternal characteristics. They collected dietary data from these women across all gestational trimesters, and conducted two 24-hour dietary recalls for each trimester one in person and another via telephone, with one of these recalls scheduled for a weekend or holiday. Their analysis revealed the presence of three distinct dietary patterns: Traditional Brazilian Pattern, Predominantly Ultra-Processed and Beef Pattern, Whole Grains, Fruits, Vegetables, Low-Fat Milk, and Dairy Pattern. The finding revealed that associations between adherence to these dietary patterns and maternal characteristics yielded several interesting findings. These findings provided valuable insights into the dietary behaviors of pregnant women and the factors influencing their dietary choices. Understanding these patterns and their associations can inform targeted interventions and support for pregnant women to ensure they maintain a balanced and healthy diet throughout pregnancy. Additionally, their results also highlighted the dynamic nature of dietary preferences during pregnancy, emphasizing the importance of considering these changes in nutritional care and guidance for expectant mothers (Gomes et al., 2019).

Similarly, many participants mentioned that the last months of pregnancy were especially vital as the baby gains weight and needs more energy. The key findings showed that during the spring and summer seasons, most mothers included a variety of vegetables and fruits in their diets due to their availability. Conversely, during the winter season, when vegetables were scarce, some resorted to consuming tea and simple boiled water salan. This finding resonates with a community-based cross-sectional study, carried out in marginalized rural and urban areas in India, in October 2016. Dietary data were collected through a comprehensive food frequency questionnaire, which comprised 204 food items, grouped into 16 major categories. Employing

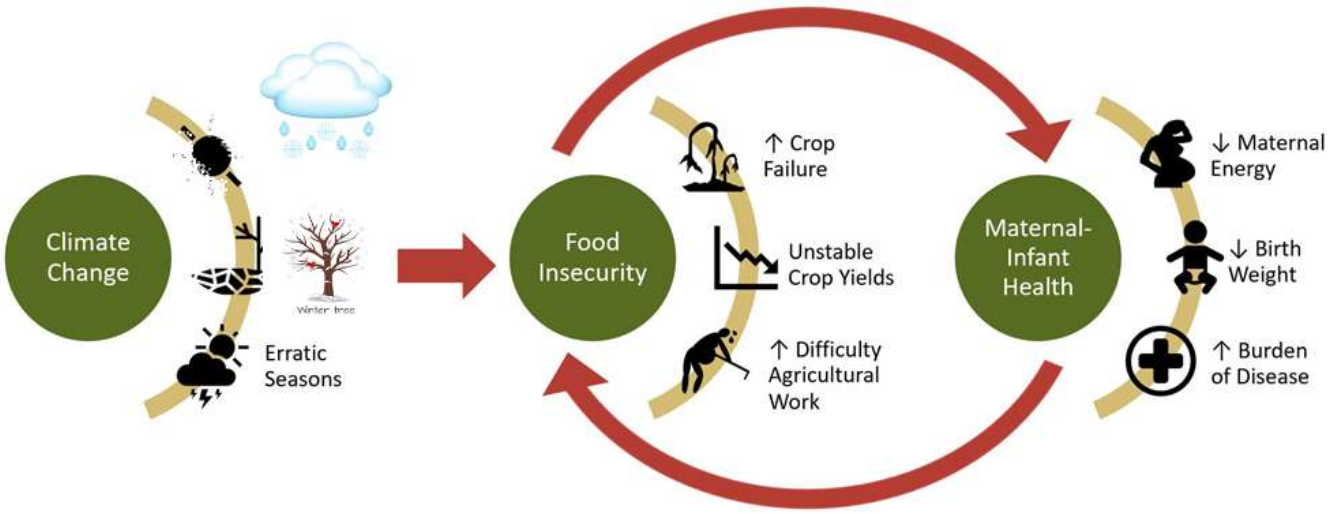
principal component analysis, four primary dietary patterns were identified: low-mixed vegetarian, non-vegetarian, high-mixed vegetarian, and calorie-rich. These dietary patterns collectively accounted for 54% of the variation in food intake among the participants. Their findings revealed that socio-demographic factors significantly influenced dietary patterns. Hindus and women residing in rural areas were more likely to consume a low-mixed vegetarian diet, while working women and those who received nutrition advice during pregnancy or lactation were more inclined towards a high-mixed vegetarian diet. These insights highlight the importance of promoting healthier dietary patterns during pregnancy and lactation, particularly among marginalized populations. The study also warranted tailored nutrition interventions to ensure the well-being of pregnant and lactating women in these communities (Sharma et al., 2020).

Climatic Impact on Food Insecurity and Maternal-Infant Health

Under this theme, the researcher started with general questions about how climate change affects maternal health and pregnancy outcomes during the harsh winter season. It became evident that during cold weather, there is an increase in premature births and stillbirths, mainly because mothers do not get enough nutrition during pregnancy. In addition, several participants revealed that women and their babies are sick and weak during winter, and pregnancies become a hurdle for them, often resulting in stillbirth or preterm babies. Babies have often chest infections in winter. These findings were coherent with Bryson et al. (2021), findings, pregnant women were more likely to develop hypertension, miscarriages, and stillbirths due to cold temperatures and food insecurity.

The following figure shows how climate change leads to food shortages and affects the health of both mothers and infants.

Figure 5 Impact on food insecurity and maternal-infant health adapted from Bryson et al. (2021).



However, the majority of the participants shared that many mothers find themselves in a state of sickness and weakness, with a lower body weight. Mothers cannot maintain adequate nutrition during winter pregnancies, as a result, their health is weakened. Most babies born in winter are also preterm and sick. The health of children is also affected in winter due to food insecurity. These findings are coherent with the findings of a scoping review conducted by Gloria Macassa et al. (2022), which highlighted how climate change affected maternal and child health. Their findings revealed that during pregnancy, women are physically more vulnerable, and changes in hormonal levels can affect their immune systems, making them more sensitive to temperature changes. Hence, cold weather, in particular, can weaken their immune responses, making them more susceptible to infectious diseases and non-infectious diseases. Likewise, a few studies carried out in lower-middle-income countries (LMICs), revealed that climate change

has led to natural disasters and extreme weather events, which, in turn, have direct and indirect effects on women's health (Abdullah et al., 2019).

A few participants shared that they had lost their relatives due to blood deficiency, bleeding disorders, or complications during labor when they fell ill during pregnancy. They mentioned challenges related to timely hospital access and inadequate hospital facilities, which often led to delayed treatment and increased chances of fatalities. Likewise, in Nepal, it was discovered that 14% of the pregnant women lost their lives, either going to or coming from a healthcare facility during disasters. Shockingly, 46% of these women died in public facilities because of complications resulting from transportation delays. This underscores that many women are eager to access healthcare, but the delays in transportation are tragically leading to fatalities (Morrison et al., 2014). These findings are also compatible with a scoping review conducted by Abdullah et al. (2019) on climate change and women in low-income countries, which revealed that women's health is particularly at risk due to climate change impacts, especially in low- and middle-income countries (LMICs). Their study findings also revealed that pregnant women were identified as the most vulnerable group during floods. Maternal deaths are, sadly, common during such events, often resulting from complications like post-delivery bleeding, obstructed labor, and prolonged labor.

Sustainable Food Security in changing climate change and Navigating Strategies.

The findings under this theme revealed a scarcity of fresh vegetables, fruits, and even milk during the extreme winter season. Additionally, some mothers highlighted that in the rural Pashtun cultures, they had to take the role of primary caregiving, which includes cooking, household chores, caring for livestock, and children, washing clothes, and even working in the fields. This heavy burden often made women vulnerable to illness and poor health. Moreover, in

addition to enduring extreme cold temperatures while working, their diets suffered, and their focus remained primarily on the well-being of others, with little consideration for their own health. Similar findings have been reported in a study conducted in the region of Ghana, in 2016, on climate change, adaptation and strategies which highlighted that woman, who are the primary workforce in houses, face significant challenges, due to floods, hurricanes, extreme heat, and droughts, although these women play a crucial role in providing daily nourishment for their families and contribute significantly to household income (Alhassan et al., 2019).

In addition, as per the findings of the study several participants shared that their babies born during the winter season tended to be weaker, malnourished, and more susceptible to illnesses. This vulnerability to infections can be attributed to the lack of nutritious food available for mothers during the cold months of winter. During the snowy winter, their dietary preferences often lean towards simple choices like tea and bread. Their children remain stunted and weakened in the winter season due to the unavailability of proper food. In contrast, Sustainable Developmental Goal 2 emphasizes the imperative of not only ensuring access to safe, nutritious, and adequate food for everyone but also eradicating all manifestations of malnutrition. On the global scale, the prevalence of malnutrition, in its various forms continues to pose a significant challenge. As of 2019, estimates reveal that 21.3 percent of the children under 5 years of age, amounting to 144 million, suffered from stunted growth, while 6.9 percent, equivalent to 47 million children, experienced wasting. Additionally, 5.6 percent, or 38.3 million children, grappled with issues of overweight. Over 17 Million children in Pakistan suffer from stunted growth due to food poverty (FAO, 2020).

The study findings also revealed that there is a significant fluctuation both in income and food expenses, particularly during the winter season. Prices for essential items, like sugar, flour,

rice, and vegetables, tend to rise, making it difficult to afford these increased costs. During winter, the variety of available foods becomes limited, with only a few vegetables like tomatoes, onions, and potatoes being accessible. This finding is in line with the finding of a national survey, conducted by Hussain and his team in Pakistan, in 2016, that investigated the effect of climate change on food security in the Hindu-Kush Himalayan (HKH) region. They collected data from 8,083 households, in four different river areas: Upper Indus in Pakistan, Eastern Brahmaputra in India, Koshi in Nepal, and Salween and Mekong in China. The findings of their survey revealed that there were more frequent natural disasters like floods, landslides, droughts, diseases affecting livestock, and pests damaging crops. The impact of these climate related changes had caused significant drop in the production of important crops, leading to temporary food shortages, crop production, and household income (Hussain et al., 2016).

In addition, many participants pointed out that vegetables became expensive during the winter season. Due to raise in the Prices of vegetables and fruits they were unable to afford it, then and were we compelled to boil water with onion and prepare salt dish called salan, or simply have and simply tea. Our cattle face difficulty finding enough grass to eat, which impacts their health. Consequently, they did not produce milk for them, ultimately affecting the people's well-being. This finding is coherent with the finding of a Nepal Demographic Health Survey 2016, which investigated household food insecurity among women in Nepal, with a focus on the Dalit women of reproductive age. The findings revealed that a significant portion of women, with 76% of Dalit women, had experienced food insecurity. Moreover, Ethnicity was found to be a strong predictor of food insecurity, with Dalit women being the most vulnerable group, facing an 82-92% higher risk as compared to other ethnicities. Additionally, education emerged as a protective factor, with women having secondary education being 39% less likely to experience

food insecurity. Their findings underscored the need for targeted interventions to address food insecurity, particularly among Dalit women, to meet the United Nations' goal of eliminating hunger by 2030 (Pandey & Fusaro, 2020).

Similarly, in Pakistan, a project conducted by The Integrated Food Security Phase Classification (IPC), from April to October 2023, found that nearly 10.5 million people (29% of the population studied) are facing acute food insecurity, with 2.1 million (6%) in the Emergency phase (IPC Phase 4) and 8.4 million (23%) in the Crisis phase (IPC Phase 3). The analysis focused on 43 rural districts in Baluchistan, Khyber Pakhtunkhwa, and Sindh, affecting about 16% of Pakistan's total population. Severe monsoon rains and floods in 2022, particularly in Sindh and Baluchistan, disrupted food production, distribution, and livelihoods, making food access a significant challenge. The situation is expected to worsen from November 2023 to January 2024, with 11.8 million people (32%) likely to experience acute food insecurity (IPC, 2023).

Building Climate Resilience: A Model for Action and Recommendations

In the winter season, Climate change risk can be assessed through three key dimensions: exposure, sensitivity, and adaptive capacity. These dimensions help evaluate the vulnerability of a particular system or community to the impacts of climate change.

Exposure

Exposure refers to the extent to which a system or population is subjected to climate change-related hazards or stressors. In the context of rural Bajaur, Pashat (study setting), exposure to climate change-related hazards is particularly pronounced due to its hilly terrain. The

hilly areas are more vulnerable to heavy rains and snowfall, increasing the likelihood of exposure to climate-related events.

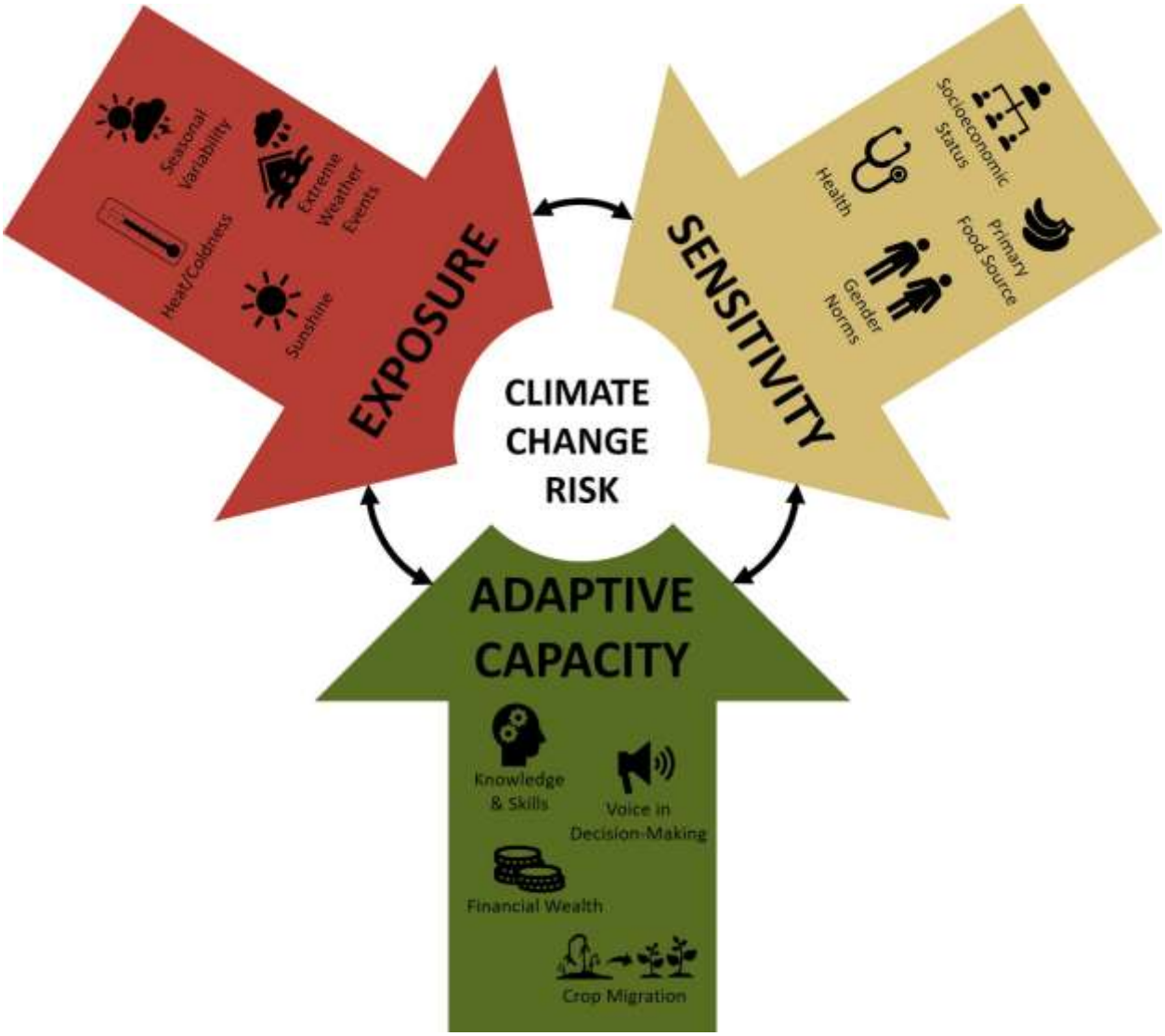
Sensitivity

Sensitivity measures how responsive or susceptible a system is to changes in climate variables. The sensitivity of the rural Bajaur Pashat community to climate change is notably high due to their economic dependence on agriculture, the vulnerability of local ecosystems, and the specific health risks faced by certain populations.

Adaptive Capacity

Adaptive capacity assesses the ability of a system or community to adjust, cope with, or adapt to the impacts of climate change. Given the vulnerability of rural Bajaur Pashat, adaptive capacity is achieved by improving access to financial resources, raising awareness about climate change, investing in resilient infrastructure, and strengthening governance structures. By addressing this exposure, sensitivity, and adaptive capacity, this holistic approach can better cope with the challenges posed by heavy rains and snowfall, ensuring food security and overall well-being during the winter season.

Figure 6 Impact of Climate Change and Resilience adapted from Bryson et al. (2021).



Strengths of the Study

The strengths of the study are as below.

- This study, exploring the experiences of indigenous mothers regarding maternal nutrition in the context of climate change. The findings offer valuable recommendations to improve maternal health during winter.

- The study created a platform for indigenous women to suggest strategies for supporting maternal health and food security during challenging seasons, particularly winter.
- The study addressed the issue of food insecurity, maternal malnutrition, during winter pregnancy, which is a highly sensitive area with regard to climate changes and extreme winter conditions.
- Additionally, the study also explored mothers' adaptive capacities, offering practical solutions to address climate change impacts.

Limitations of the study

Limitation of the study are as below.

- The study relied solely on in-depth interviews and did not include focus group discussions.
- The study was confined to a single region within one district and did not encompass multiple regions of Bajaur or several northern districts of Bajaur.
- The study focused on household mothers; and were not gathered experiences or perspectives from household fathers.
- Additionally, it is important to note that, the findings of this study are specific to cold climate affected northern regions of Pakistan and may not be applicable to hot regions.

Recommendations

Future Research

- The study encourages interdisciplinary research that brings together experts from fields like nutrition, environmental science, public health, and indigenous studies. This will provide a holistic understanding of the complex connections between maternal nutrition, climate change, and food insecurity.
- The study suggests quantitative analyses to measure the prevalence and severity of maternal malnutrition in indigenous communities, mostly in regions highly vulnerable to climate change effects.
- The study recommends to conduct more in-depth qualitative studies involving a diverse range of indigenous communities to understand the experiences and perspectives of indigenous mothers. These studies should emphasis on the cultural, environmental, and societal factors that affect maternal nutrition in the context of climate change.

Education

- Government and non-government officials arrange sessions for rural women, to understand how climate change affects food security, maternal nutrition, and the health of mothers and infants. These sessions would empower communities with valuable knowledge.

- Stakeholders need to organize training programs on the importance of their diets during harsh winter conditions. These programs will provide teaching on how to take specialized in harsh winter pregnancies.

Food Security Policies

- The governments should create distinct food security policies for the northern regions of KPK because these areas have unique vulnerabilities that vary in terms of their nature, type, and severity. Additionally, it is essential to reassess agricultural policies considering the expected shifts in climate conditions.

- Climate change has also created some opportunities that have not fully taken advantage of. For example, in certain areas, households have noticed an increase in the production of summer fruits like apples, apricots, and walnuts over the past decade. Similarly, in other regions, there has been a notable rise in the production of summer crops such as potatoes, onions, and vegetables. When making plans at both the national and regional levels, these emerging opportunities need to be considered. They can play a crucial role in implementing strategies to achieve long-lasting food security in these areas.

- Both government and non-government officials should identify specific areas within the northern regions of KP, where maternal nutrition needs improvement, especially to address issues like preterm births and stillbirths caused by heavy snowfall and rainfall.

Rural Food Program

- Adequate food programs should be provided in these areas, including maternal food assistance and infant food formulas, to prevent maternal and infant malnutrition.

- Moreover, maternal training programs should be conducted to educate these women about their pregnancy diets in extreme winter and also to update then regarding potential outcomes.

Summary of the Chapter

This chapter highlighted the key findings of the study, which explored the experiences of indigenous women concerning maternal nutrition in the context of climate change and extreme cold weather. The findings were examined in the context of existing empirical literature. While many of the findings were in alignment with previous research, but there were some differences. One significant difference was that the current study took place in a less developed country, while some earlier research is from more developed nations. Additionally, this study concentrated maternal nutrition in extreme cold weather while most previous studies have focused on global warming and its relation with heat and food insecurity.

In conclusion, this chapter also discussed the strengths and limitations of the study and also provided recommendations for further research and action.

Conclusions of the Study

This study has uncovered many challenges faced by the rural women of Bajaur. Both existing literature and these findings highlight the importance of addressing food security issues related to heavy snowfall, rainfall, and prolonged freezing temperatures during winter. These weather conditions have adverse effects on maternal health and pregnancy outcomes.

The study also found that rural communities are trapped in a cycle where climate change problems make their lives harder. The government has not put in place any plans to help rural communities deal with the effects of climate change, and as a result, food insecurity is a

significant problem. There is a vital need for long-term policies to address these issues in rural communities.

The study also pointed out that insufficient access to information about climate change is a big problem in Bajaur. The study showed that the methods for warning people about climate-related issues and responding to them need improvement. Instead of relying solely on traditional knowledge, communities should also receive information and predictions about things like rainfall

In summary, the study found a significant connection between climate change and food insecurity, particularly concerning maternal malnutrition during winter, in Bajaur, Pakistan.

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Appendices A Permission Letter for Data Collection

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

Faculty of Health Sciences
School of Nursing & Midwifery

January 13, 2023

Dr. Faisal [redacted]
District Health Officer,
District Bajaur, KPK.

Subject: Permission for Data Collection in Category D Hospital, Pashat

Dear Dr. Faisal,

This is to state that one of my Master's students, belongs to Bajaur, KPK, and is currently enrolled in the Master of Sciences in Nursing (MScN) program at the Aga Khan University, School of Nursing and Midwifery in Karachi, Pakistan. He is carrying out a research study under my supervision as part of the Master's program.

The title of his study is "Impact of Climate Change on Food Security during Pregnancy among Rural Maternal Women" seeking Maternal care in Category D Hospital Pashat, District Bajaur, KPK. The objective of the study is to obtain information about Maternal women's experiences and perceptions regarding the significance of climate change on food security during pregnancy. The findings of this study will be disseminated to health authorities to devise effective policies to mitigate the adverse impacts of climate change on maternal nutrition, which desperately affect newborn health. The study outline is attached on page 2.

The study is only intended for academic purposes. There is no plausible harm to study participants and no monetary compensation will be provided to participants. The study purpose and ethical considerations brief is attached.

In light of these considerations, your permission is required to conduct this research study, which is required for the approval of Aga Khan University's Ethics Review Committee (ERC).

Sincerely,

Dr. Rafat Jan
Thesis Supervisor
Associate Dean and Professor
School of Nursing and Midwifery
Aga Khan University, Pakistan

The title of my study is "Impact of Climate Change on Food Security during Pregnancy among Rural Maternal Women" seeking Maternal care in Category D Hospital, Pashat, District Bajaur, KPK.

Study Purpose:

The purpose of the study is to determine the experiences and perceptions of maternal women regarding the effect of climate change on food security during their pregnancy period. The outcome of this study will be given to health authorities to plan proper policy to mitigate this harmful effect of climate change on maternal nutrition, which ultimately affects infant health as well.

Risk factors and Benefits:

This study is only for academic purposes and no potential harm is anticipated for the study participants. Moreover, there will be no monetary, funds in return for participants.

Ethical Consideration:

Data collection will be started after the approval of the Ethical Review Committee of Aga Khan University Hospital. The proposed study will consider all the possible ethical considerations including anonymity, confidentiality, informed consent, and hospital permission. The finding of the study will be disseminated without identifying the personal information about participants.

The study will be conducted at Category D Hospital, Pashat, District Bajaur, KPK.

Study Target Population:

The target population will be maternal women who seeking care in the mentioned hospital. These women will be interviewed, and their perceptions and experience will be recorded regarding maternal nutrition in response to climate change.

Sample Size: The expected sample size for this study will be around 10 to 16 participants.

Study timeline: The data will be collected from January to June 2023.

Appendices B Acceptance Form of Data Collection

Subject: Acceptance Form

Title of Research Study

"Impact of Climate Change on Food Security during Pregnancy among Rural Maternal Women"

Primary investigator: Mr. Ihsan Ullah
Master of Sciences in Nursing (MScN)
Aga Khan University, School of Nursing and Midwifery
Karachi, Pakistan

Thesis supervisor: Dr. Rafat Jan
Professor and Outreach Dean
Aga Khan University, School of Nursing and Midwifery
Karachi, Pakistan

I, Dr. Faisal Sultan, District Health Officer, Bajaur, KPK accept to access the participant in Category D Hospital, Pashat and collect the data and required information after seeking informed consent in the study.

Dr. Faisal [redacted]
District Health Officer,
Bajaur, KPK

District Health Officer
Bajaur

Appendices C Ethical Review Committee Approval

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

28-Apr-2023

Dr. RAFAT IAN
Department of School of Nursing and Midwifery
Aga Khan University
Karachi

Dear Dr. RAFAT IAN,

2023-8518-24868, RAFAT IAN: Experiences of Indigenous Childbearing Ages Mothers with Maternal Nutrition in Climate Change (Cold Weather) in Rural Bajaur, Khyber Pakhtunkhwa, Pakistan
Implications for Maternal Infant Health

Thank you for submitting your application for ethical approval regarding the above mentioned study.

Your study was reviewed and discussed in ERC meeting. There were no major ethical issues. The study was given an approval for a period of one year with effect from 28-Apr-2023. For further extension a request must be submitted along with the annual report.

List of document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
ICH-GCP certificate -RJ	24-Feb-2023	1
GCP CERTIFICATE ihsan	24-Feb-2023	1
Certificate of Participation-HSP,RCR,GCP,GCLP-Dilshad Begum	24-Feb-2023	1
CITI Kiran Mubeen Apr 18 2021	04-Mar-2023	1
Demographic Profile of participants (1)	04-Mar-2023	1
Demographic Profile of PASHTHO 3	04-Mar-2023	1
URDU DEMOGHRAPIC	04-Mar-2023	1
Permission letter from DHO	04-Mar-2023	1
permission letter from MS of RHC	04-Mar-2023	1
Affidivate of translation	04-Mar-2023	1
Consent Form IDI ,English version 2 (1)	23-Mar-2023	version 2
Affidavit of urdu translation (2) (1)	23-Mar-2023	1
consent form urdu version 3	08-Apr-2023	version 3
consent form pashthu version 3	08-Apr-2023	version 3
STUDY GUIDE ENGLISH	27-Apr-2023	2
THESIS PROPOSAL	27-Apr-2023	3
STUDY GUIDE URDU	27-Apr-2023	2
STUDY GUIDE PASHTHU	27-Apr-2023	2
Sample form for - ERC Response (1)	27-Apr-2023	1

Any changes in the protocol or extension in the period of study should be notified to the Committee for prior approval. All informed consents should be retained for future reference.

Please ensure that all the national and institutional requirements are met.

Thank you.

Sincerely,

Dr. Shabbir Akhtar

Chairperson
Ethics Review Committee

Appendices D Informed Consent for In depth Interview (English Version)

Informed Consent Form for In-depth InterviewsProject Information

Project Title: "Experiences of Indigenous child bearing ages Mothers with Maternal Nutrition in the context of Climate Change (Cold Weather) in Rural Bajaur, Khyber Pakhtunkhwa, Pakistan

Implications for Maternal-Infant Health

ERC application no: 8518	**Dr. Rafat Jan** **Professor and outreach dean policy unit** **At AKU-SONAM** **Supervisor** Rafat.jan@aku.edu Phone: 021-34865463
	MS. Dilshad begum Coordinator Clinical Trial Unit AKUH Committee member Dilashad.begum@aku.edu
	MS. Kiran Mubeen Senior Nursing Instructor AKU-SONAM Committee member Kiran.mubeen@aku.edu Phone: 03333181331
	Mr. Ihsan Ullah

	MSCN student AKU –SONAM Ihsan.ullah3@scholar.aku.edu Cell 03088410801

OVERVIEW

My name is **Ihsan Ullah,** I am a Master's scholar at the School of nursing and Midwifery at Aga Khan University, Karachi, Pakistan. I am conducting a researchstudy on **"Experiences of Indigenous childbearing age's mother with Maternal Nutrition in the context of Climate Change (Cold Weather), in Rural Bajaur, Khyber Pakhtunkhwa, Pakistan**.

You will be provided with all the required information regarding the study and your participation in this study. Moreover, before making a decision, you can ask anything for clarification that makes you feel uncomfortable with this study. In addition, participants have the right to withdraw from the studyat any time, and not participating in this study will not affect you at any cost. A copy of the consent form will be provided to each participant.

PURPOSE OF THIS RESEARCH STUDY

To explore the experiences of indigenous women with maternal nutrition in the context of Climate change (cold weather) in rural Bajaur KPK, Pakistan

PROCEDURES

As a participant, your interview will be conducted and you are requested to answer the questions. The questions are divided into two parts: Demographic details and the questions about Your '**Experiences of Indigenous Women with Maternal Nutrition in the context of Climate Change (Cold Weather) in Rural Bajaur, Khyber Pakhtunkhwa, Pakistan"**

Your participation in this research is voluntary. If you consent to participate then the date, time, and venue for the interview will be decided based on your availability and convenience. The interview will be conducted as per your preference of language, i.e., Pashtu or Urdu.

I have a list of questions regarding maternal nutrition and climate change that I will ask to learn from your experiences and perceptions. I may not be able to write your whole discussion; therefore, I wouldlike to audio record the discussion with your permission, which will facilitate me to make full notes after the discussion, thus any information will not be missed out. All the recorded data will be discarded upon the study's completion and I will ensure that you are satisfied with the process. The interview time is expected to be 40-60 minutes. Simultaneously, the interview will be recorded. The study will be carried out for a period of 6 months (May 2023 to October 2023). A hard copy of the consent form will be provided to the participants before initiating the interviews.

The secrecy of your responses will be maintained as your data will be assigned a code number and your employee numbers will not be used as an identifier. Also, throughout the process your anonymity will be maintained; the research report will be disseminated through an oral defense of the thesis, an oral presentation at scientific forums, and publication in scientific journals.

POSSIBLE RISKS OR DISCOMFORT

There are no potential risks involved in this study. You do not have to feel obliged to answer anyquestion that might make you uncomfortable.

POSSIBLE BENEFITS

There are no direct benefits to the participants, but you will contribute to society by sharing yourexperiences. This will help us understand the underlying factors that climate change affects maternal nutrition during pregnancy.

FINANCIAL CONSIDERATIONS

This study will not offer any financial encouragement to the participants

CONFIDENTIALITY

Your privacy will be ensured throughout the duration of the study. Moreover, all the collected data will be kept in locked cabinets, and data in soft copies will be secured by a password. The data will only be accessible to the principal investigator and committee members. However, the monitoring and evaluation team of the human ethics committee, AKU may review the data for quality assurance

RIGHT TO REFUSE OR WITHDRAW

Participants will have the right to withdraw from the at any point in time. They will not be forced and will not be threatened. Participants have the right to answer or refuse to answer any question of the study.

AVAILABLE SOURCES OF INFORMATION

In case of any queries and questions, you may contact the following: Ihsan Ullah at AKU- SONAM, Karachi, Pakistan (03088410801) or Dr. Rafat Jan at AKU-SONAM,Karachi, Pakistan (021-34865463).

AUTHORIZATION

I have read all the information mentioned above, or it has been read to me. Further, the PI has answered my questions to my satisfaction. Therefore, I give my voluntary consent to participate in this study.

Name of Participant

Signature_____ Date _____

Name of the principal investigator _____

Signature_____ Date _____

Name of the person obtaining consent: _____

Signature_____ Date _____

For participants who cannot readWitness:

I have witnessed the entire reading process, on behalf of the participant. The questions of the participants are answered to satisfaction, by the thesis core team. Therefore, I endorse that theparticipant has voluntarily agreed to participate in the current study.

Name of the person obtaining consent: _____

Signature_____ Date _____

Name of witness_____

The thumbprint of the participant_____Date _____

Appendices E Informed Consent for In depth Interview (Urdu Version)

گہرائی سے انٹرویو کے پروجیکٹ کے لیے باخبر رضامندی کا فارم

پروجیکٹ کا عنوان: "دیہی باجوڑ، خیبر پختونخواہ، پاکستان میں موسمیاتی تبدیلی (سرد موسم) میں زچگی کی غذائیت کے ساتھ مقامی خواتین کے تجربات: زچگی کے بچوں کی صحت پر مضمرات

ڈاکٹر رفعت جان پروفیسر اور آؤٹ ریچ ڈین پالیسی یونٹ مقام: سکول آف نرسنگ اینڈ مڈوائفری میں سپروائزر Rafat.jan@aku.edu فون: 021-34865463	ERC Ref No: 8518 اسپانسر: غیر
مس دلشاد بیگم آغا خان یونیورسٹی ہسپتال کلینیکل ٹرائل کوآرڈینیٹر کمیٹی ممبر Dilashad.begum@aku.edu فون 021-34862303	
مس کرن مبین سینئر نرسنگ انسٹرکٹر	

مقام: سکول آف نرسنگ اینڈ مڈوائفری کمیٹی ممبر Kiran.mubeen@aku.edu فون 03333181331	
مسٹر احسان اللہ نرسنگ سائنسز میں ماسٹر کی طالب علم مقام: سکول آف نرسنگ اینڈ مڈوائفری Ihsan.ullah3@scholar.aku.edu فون 03088410801	

میرا نام احسان اللہ ہے، میں آغا خان یونیورسٹی، کراچی، پاکستان کے اسکول آف نرسنگ اینڈ مڈوائفری میں ماسٹر سکالر ہوں۔ میں پاکستان کے دیہی باجوڑ، خیبر پختونخواہ میں موسمیاتی تبدیلی (سرد موسم) میں ماں کی غذائیت کے ساتھ مقامی خواتین کے تجربات پر ایک تحقیقی مطالعہ کر رہا ہوں۔

آپ کو مطالعہ اور اس مطالعہ میں آپ کی شرکت سے متعلق تمام مطلوبہ معلومات فراہم کی جائیں گی۔ مزید برآں، کوئی فیصلہ کرنے سے پہلے، آپ وضاحت کے لیے کچھ بھی پوچھ سکتے ہیں جس سے آپ کو اس مطالعے میں تکلیف محسوس ہو۔ اس کے علاوہ، شرکاء کو کسی بھی وقت مطالعہ سے دستبردار ہونے کا حق حاصل ہے، اور اس مطالعہ میں حصہ نہ لینے سے آپ کو کسی بھی قیمت پر اثر نہیں پڑے گا۔ رضامندی فارم کی ایک کاپی ہر شریک کو فراہم کی جائے گی۔

اس تحقیقی مطالعہ کا مقصد:

اس مطالعے کا مقصد پاکستان کے دیہی باجوڑ کے پی کے میں زچگی کی خواتین میں حمل کے دوران غذائیت پر موسمیاتی تبدیلی کے اثرات کی نشاندہی کرنا ہے۔

طریقہ کار:

میں آپ کو ون ٹو ون انٹرویو کے ساتھ IDI میں شرکت کی دعوت دوں گا، میں خود IDI کروں گا۔ میرے پاس موسمیاتی تبدیلی سے متعلق سوالات کی ایک فہرست ہے جو میں آپ کے تجربات اور تاثرات سے سیکھنے کے لیے کہوں گا

میں شاید آپ کی پوری بحث نہ لکھ سکوں۔ اس لیے میں آپ کی اجازت سے اس بحث کو آڈیو ریکارڈ کرنا چاہوں گا، جس سے مجھے بحث کے بعد مکمل نوٹ بنانے میں مدد ملے گی، اس طرح کسی بھی معلومات سے محروم نہیں رہے گا۔ تمام ریکارڈ شدہ ڈیٹا مطالعہ کے مکمل ہونے پر ضائع کر دیا جائے گا اور میں اس بات کو یقینی بناؤں گا کہ آپ اس عمل سے مطمئن ہیں۔ یہ مطالعہ 6ماہ (مئی 2023 سے اکتوبر 2023) کے لیے کیا جائے گا۔

انٹرویو کا وقت 40-60 منٹ تک متوقع ہے۔ ساتھ ہی انٹرویو بھی ریکارڈ کیا جائے گا۔ یہ مطالعہ 6ماہ (مئی 2023 سے اکتوبر 2023) کے لیے کیا جائے گا۔ انٹرویوز شروع کرنے سے پہلے شرکاء کو رضامندی کے فارم کی ہارڈ کاپی فراہم کی جائے گی۔

ممکنہ خطرات یا تکلیف:

اس مطالعہ میں کوئی ممکنہ خطرات شامل نہیں ہیں۔ آپ کو کسی ایسے سوال کا جواب دینے کا پابند محسوس کرنے کی ضرورت نہیں ہے جس سے آپ کو تکلیف ہو۔

ممکنہ فوائد:

شرکاء کو کوئی براہ راست فائدہ نہیں ہے، لیکن آپ اپنے تجربات کو بانٹ کر معاشرے میں اپنا حصہ ڈالیں گے۔ اس سے ہمیں ان بنیادی عوامل کو سمجھنے میں مدد ملے گی جو موسمیاتی تبدیلی حمل کے دوران ماں کی غذائیت کو متاثر کرتی ہیں۔

مالی تحفظات:

یہ مطالعہ شرکاء کو کوئی مالی حوصلہ افزائی نہیں کرے گا۔

رازداری:

ہماری طرف سے اس بات کو یقینی بنانے کے لیے ٹھوس اقدامات کیے گئے ہیں کہ آپ کی معلومات کو خفیہ رکھا جائے۔ ہم شرکاء کو ان کے نام بتانے کے بجائے کوڈ فراہم کریں گے۔ تمام ڈیٹا کو لاک اور کلید میں رکھا جائے گا جس کی رسائی صرف PI اور تھیسس کور ٹیم تک ہو گی۔

انکار یا واپس لینے کا حق:

شرکاء کو کسی بھی وقت اس سے دستبردار ہونے کا حق حاصل ہو گا۔ انہیں مجبور نہیں کیا جائے گا اور انہیں دھمکیاں نہیں دی جائیں گی۔ شرکاء کو مطالعہ کے کسی بھی سوال کا جواب دینے یا جواب دینے سے انکار کرنے کا حق ہے۔

معلومات کے دستیاب ذرائع:

کسی بھی سوالات اور سوالات کی صورت میں، آپ درج ذیل سے رابطہ کر سکتے: احسان اللہ سکول آف نرسنگ اینڈ مڈوائفری کراچی، پاکستان (03088410801) یا ڈاکٹر رفعت جان سے سکول آف نرسنگ اینڈ مڈوائفری ، کراچی، پاکستان (021-34865463)

اجازت:

میں نے اوپر بیان کی گئی تمام معلومات پڑھ لی ہیں، یا مجھے پڑھی گئی ہیں۔ مزید، PI نے میرے سوالات کے اطمینان بخش جوابات دیئے۔

لہذا، میں اس مطالعہ میں حصہ لینے کے لیے اپنی رضاکارانہ رضامندی دیتا ہوں۔

نتائج کی تقسیم:

اس مطالعے سے حاصل کردہ نتائج کو تولیدی صحت کے شعبے میں پروگرام کے نفاذ کرنے والوں اور پالیسی سازوں کے ساتھ شیئر کیا جائے گا، اس سے پہلے کہ اسے اشاعتوں، کانفرنسوں وغیرہ جیسے ذرائع سے عام لوگوں تک پہنچایا جائے۔

شریک کا نام

دستخط کی تاریخ:

پرنسپل تفتیش کار کا نام:

دستخط کی تاریخ

رضامندی حاصل کرنے والے شخص کا نام:

دستخط کی تاریخ:

ان شرکاء کے لیے جو گواہ نہیں پڑھ سکتے:

میں نے شرکت کنندہ کی طرف سے پڑھنے کے پورے عمل کو دیکھا ہے۔ تھیسس کورٹیم کی طرف سے شرکاء کے سوالوں کا اطمینان بخش جواب دیا جاتا ہے۔ لہذا، میں اس بات کی توثیق کرتا ہوں کہ شریک نے رضاکارانہ طور پر موجودہ مطالعہ میں حصہ لینے پر رضامندی ظاہر کی ہے

رضامندی حاصل کرنے والے شخص کا نام:

دستخط کی تاریخ:

گواہ کا نام:

شرکت کنندہ کے انگوٹھے کا نشان تاریخ:

Appendices F Informed Consent for In depth Interview (Pashto Version)

د پروژې د معلوماتو د ژورو مرکو لپاره

د رضایت فورمه

د پروژې سرلیک: د باجور په کلیوالي سیمو کې د میندو میرمنو تر مینځ د امیندواری پرمهال د اقلیم بدلون او د خوړو خوندیتوب: د مور او ماشوم روغتیا لپاره اغیزې

ډاکټر رفعت جان پروفیسور او د پوهاوي رییس د پالیسي واحد اداره: آغا خان پوهنتون کراچي ځای: د نرسنګ او قابله ګي ښوونځی ځارونکی تلیفون: 34865463-021 Rafat.jan@aku.edu	سپانسر: نه ERC Ref No:8518
غلي دلشاد بیګم اداره: همغږي کوونکي کلینیکي تربل یونټ، آغا خان پوهنتون روغتون د کمیټې غړی تلیفون 021-3486230 Dilashad.begum@aku.edu	
آغلې کرن مبین	

د نرسنګ لوړ پوړی ښوونکی ځای: د نرسنګ او قابله ګی ښوونځی د کمیټې غړی Kiran.mubeen@aku.edu تلیفون 03333181331	
شاغلی احسان الله د نرسنګ په برخه کې د ماسټری محصل ځای: د نرسنګ او قابله ګی ښوونځی. Ihsan.ullah3@scholar.aku.edu تلیفون 03088410801	

عمومي کتن

زما نوم احسان الله دی، زه د اغا خان پوهنتون، کراچی، پاکستان کې د نرسنګ او قابله ګی په ښوونځي کې د ماسټری سکالر یم. زه د پاکستان د خیبرپښتونخوا په کلیوالي باجوړ کې د اقلیم د بدلون (سړې هوا) په شرایطو کې د میندو تغذیه سره د داخلي ماشوم زیږون عمر د مور تجربې په اړه یوه څیړنه ترسره کوم. تاسو ته به د مطالعې او پدې څیړنه کې ستاسو د ګډون په اړه ټول اړین معلومات درکړل شي. سربیره پردې، د پریکړې کولو دمخه، تاسو کولی شئ د وضاحت لپاره هر څه وغواړئ چې تاسو د دې مطالعې سره نا آرامی احساس کوئ. برسېره پردې، ګډون کوونکي حق لري چې په هر وخت کې له مطالعې څخه ووځي، او پدې څیړنه کې ګډون نه کول به تاسو په

هیڅ قیمت اغیزه ونکړي. د رضایت فارم یوه کاپي به هر ګډون کونکي ته ورکړل شي

د دې څېړنې هدف

د پاکستان په کلیوالي باجوړ کې د موسمي بدلون (سړې هوا) په شرایطو کې د میندو تغذیه سره د ځایی میرمنو تجربو سپړلو لپاره

.

کړنلاره

د ګډون کونکي په توګه، ستاسو مرکه به ترسره شي او تاسو څخه غوښتنه کیږي چې پوښتنو ته ځواب ووایاست. پوښتنې په دوه برخو ویشل شوي دي: د ډیموګرافیک توضیحات او ستاسو په اړه پوښتنې "د خیبر پښتونخوا په کلیوالي باجوړ کې د موسمي بدلون (سړې هوا) په شرایطو کې د میندو تغذیه سره د اصلي میرمنو تجربې" پدې څېړنه کې ستاسو ګډون داوطلبانه دی. که تاسو د ګډون لپاره رضایت لرئ نو د مرکې نیټه، وخت، او ځای به ستاسو د شتون او اسانتیا پراساس پریکړه کیږي. مرکه به ستاسو د ژبې د خوښې سره سم ترسره کیږي، لکه پښتو یا اردو.

زه د میندو د تغذیې او د اقلیم د بدلون په اړه د پوښتنو لیست لرم چې زه به یې ستاسو له تجربو او لیدونو څخه زده کړم. زه شاید ستاسو ټول بحث نه شم لیکلی؛ له همدې امله، زه غواړم ستاسو په اجازې سره خبرې اترې آډیو ثبت کړم، چې دا به ما ته اسانه کړي چې د بحث وروسته بشپړ یادښتونه جوړ کړم، پدې توګه به هیڅ معلومات له لاسه ورنکړل شي. ټول ثبت شوي معلومات به د مطالعې په بشپړیدو سره له مینځه یوړل شي او زه به ډاډ ترلاسه کړم چې تاسو د پروسې څخه راضي یاست. د مرکې وخت تمه کیږي 40-60 دقیقې وي. په ورته وخت کې، مرکه به ثبت شي. څېړنه به د 6 میاشتو لپاره ترسره شي (د می 2023 څخه تر اکتوبر 2023). د مرکې پیل کولو دمخه به د رضایت فارم یوه هارډ کاپي برخه اخیستونکو ته ورکړل شي.

د مرکې وخت تمه کېږي 40-60 دقیقې وي. په ورته وخت کې، مرکه به ثبت شي. څېړنه به د 6 میاشتو لپاره ترسره شي (د می 2023 څخه تر اکتوبر 2023). د رضایت فارم یوه هارډ کاپي به د مرکې له پیل کولو دمخه ګډونوالو ته ورکړل شي.

ستاسو د ځوابونو محرمیت به ساتل کېږي ځکه چې ستاسو معلوماتو ته به د کوډ شمیره ورکړل شي او ستاسو د کارمندانو شمیره به د پیژندونکي په توګه ونه کارول شي. همچنان ، د پروسې په جریان کې به ستاسو هویت ساتل کېږي؛ د څېړنې راپور به د مقالې د شفاهي دفاع، په ساینسي فورمونو کې د شفاهي پریزنټیشن، او په ساینسي ژورنالونو کې د خپرولو له لارې خپور شي.

احتمالي خطرونه او ناخوښي:

په دې څېړنه کې هیڅ احتمالي خطر شتون نلري. تاسو اړتیا نلرئ چې د کومې پوښتنې ځواب ورکړئ چې ممکن تاسو نارامه کړي.

حتمالي ګټې

ګډون کوونکو ته مستقیمه ګټه نشته، مګر تاسو به د خپلو تجربو په شریکولو سره ټولنه کې مرسته وکړئ. دا به مور سره مرسته وکړي چې په اصلي فکتورونو پوه شو چې د اقلیم بدلون د امیندوارۍ پرمهال د میندو تغذیه اغیزه کوي.

مالي نظرونه:

دا څېړنه به برخه اخیستونکو ته هیڅ مالي هڅونه ونه کړي

محرمیت:

ستاسو محرمیت به د مطالعې په ټوله موده کې تضمین شي. سربیره پردې، ټول راټول شوي معلومات به په بند کابینې کې وساتل شي، او په نرمو کاپیونو کې ډاټا به د پاسورډ لخوا خوندي شي. معلومات به یوازې د اصلي تحقیق کونکي او د کمیټې غړو ته د لاسرسي وړ وي. په هرصورت، د بشري اخلاقي کمیټې د څارنې او ارزونې ټیم، AKU ممکن د کیفیت تضمین لپاره ډاټا بیاکتنه وکړي.

برخه اخیستونکي به په هر وخت کې د وتلو حق ولري. دوی به نه جبري کیږي او نه به ګواښل کیږي. برخه .اخیستونکي حق لري چې د مطالعې هرې پوښتنې ته ځواب ووایی یا انکار وکړي

د پایلو خپرول:

ګډون کوونکي به په هر وخت کې د وتلو حق ولري. دوی به نه جبري کیږي او نه به ګواښل کیږي. برخه اخیستونکي حق لري چې د مطالعې هرې پوښتنې ته ځواب ووایی یا انکار وکړي.

.

د معلوماتو موجودې سرچینې:

د هرې پوښتنې او پوښتنې په صورت کې، تاسو کولی شئ لاندې اړیکه ونیسئ: احسان الله د آغا خان پوهنتون روغتون کراچی، پاکستان (03088410801) یا ډاکټر رفعت جان د آغا خان پوهنتون د نرسنګ او قابله ګی ښوونځي، کراچی، پاکستان (34865463-021)

اجازه ورکول:

ما پورته ذکر شوي ټول معلومات لوستلي دي، یا دا ما لوستلي دي. برسېره پر دې، PI زما پوښتنو ته زما د اطمینان ځواب ورکړ. له همدې امله زه په دې ځېرنه کې د ګډون لپاره خپله داوطلبانه رضایت ورکوم.

د ګډون کوونکي نوم.....

لاسلیک.....

نیټه ....

د اصلي پلټونکي

نوم----------

لاسلیک.....

نیټه .....

د هغه کس نوم چې رضایت ترلاسه

کوي----------

:----------

لاسلیک.....

نیټه .....

د ګډون کونکو لپاره چې نشي کولی شاهد لوستل شي:

ما د ګډون کونکي په استازیتوب د لوستلو ټوله پروسه لیدلې ده. د ګډونوالو پوښتنو ته د مقالې اصلي ټیم لخوا د رضایت سره ځواب ویل کیږي. له همدې امله، زه تاییدِ کوم چې ګډون کوونکي په داوطلبانه توګه په اوسنۍ څېړنه کې د ګډون کولو موافقه کړې ده.

د هغه کس نوم چې رضایت ترلاسه کوي

_____

لاسلیک

_____ نیټه _____

د شاهد نوم

_____

_____ نیټه _____ د ګډون کوونکي د ګوتې نښه

Appendices G Study Guide (English)

General Guidelines for In-depth Interviews

The researcher will formally greet and address the participant and will introduce him and his role in the study. After introducing myself, the participant will be invited to introduce himself or herself and provide informed consent before starting the formal interview. The participant's contribution to the discussion will be voluntary; if they do not want to participate in this discussion, they will not be forced to participate. The discussion will be audio-recorded with the participant's permission. The interviewer will explain the purpose of the study to the participants in detail. Moreover, the interviewer will not give a comment on whether the participant is right or wrong. The interviewerwill also refrain from blaming things and engaging in conflicts.

Participants

In-depth interviews (IDI) will be conducted with the local indigenous mothers that come to category D hospital Pashat Bajaur, for seeking maternal health in tehsil Salazar, district Bajaur KPK, upon achieving saturation further IDI will be stopped.

Venue for IDI

An appropriate place and time will be decided for conducting the IDI after taking consent from the participant.

Data Collection

The researcher will be collecting data through IDI using a study guide by asking open-ended questions to the participants. The pilot testing of the study will be done before conducting the formal IDI in a similar setting.

Pre-requisites for the IDI

All the prerequisites will be arranged before initiating the IDI. This will include, the interview guide, consent forms, tape recorder, batteries, additional tape recorder, additional batteries, adequate stationery, and ensuring that all the equipment is working.

Introductory Scripts

Assalam-o-Alaikum

I am thankful to you for your time; I am a graduate student at Aga Khan University, School of Nursing and Midwifery. I am conducting a research study on the effect of Climate change on maternal nutrition. I will take your time for asking some questions regarding maternal nutrition and your personal experiences with it, while taking the interview I will also take some notes.

This is a qualitative study and the purpose of this discussion is to identify the challenges associated with seasonality, maternal nutrition, food availability, and food security in the district of Bajaur Pakistan. Mothers and babies in Northern areas (FATA) Bajaur especially among Indigenous populations face complex, difficult, and poorly understood dangers from the expected losses in food security brought on by climate change. These indigenous populations are more vulnerable to snowfall, extremely cold temperatures, life activities, healthcare needs, and maternal health nutrition, which cannot be managed properly. Theinformation gathered from this conversation will assist the decision-makers in developing plans todeal with the key concerns.

I will discuss my questions concerning climate change and food availability to gain insight into your experiences and viewpoints. I would like to spend around 45 minutes to 60 minutes with you today. I might not be able to write down all you said, therefore with your permission, I would like to record the conversation on audio so that I can write down everything you said and not forget anything. After the study is finished, all the recorded data will be deleted

and destroyed, and I'll make sure you're satisfied with the process.

Research Question

- What are the perceptions of pregnant indigenous rural women regarding the effect of climate change on food availability during pregnancy in village Pashat tehsil salarzai, district Bajaur Khyber Pakhtunkhwa?
- What are the experiences of pregnant indigenous rural women regarding the effect of climate change on food availability during pregnancy in village Pashat tehsil salarzai, district Bajaur Khyber Pakhtunkhwa?

Questions To Explore The Theme And Sub-Theme.

Semi-structured In-depth interview guide

Topic 1: Maternal dietary patterns during pregnancy

1) Can you tell me what kinds of foods you eat when you are pregnant?

2) Is there anything special that you eat during pregnancy? If yes, why do you eat those things?

3) Do you eat a different amount of food during pregnancy compared to when you are not pregnant?

4) Does your food intake change at different times in the pregnancy?

5) When does food matter most during pregnancy? Why? (like in which trimester).

Topic 2: Food Security and Season

6) What time of year makes for better maternal nutrition? Why is it easier? Are there any bad things about getting the food you need this season?

7) What time of year makes for worse maternal nutrition? Why is it harder? Are there any good things about this season for getting the food you need? What would make this season easier?

8) When you don't have food, what strategies do you use to make up for the lack of food? Do these strategies change when you are pregnant?

Topic 3: Food-related Household expenses

Can you share your source of income? And how do you manage food-related household expenses?

9 What percentage or part of the household income is spent on food?

10 . How often does the household purchase fresh fruits and vegetables?

11) Does the household have access to a local market or grocery store? If so, how frequently do they visit it?

12) Do you think are there any seasonal fluctuations in the household's income or expenses related to food during cold weather?

13) Do you experienced any significant changes in the cost of food or food availability in extremely cold weather recently?

Topic 4: Food Security and Maternal-Infant Health over Time

14) How does nutrition affect the health of mothers?

15) How does nutrition affect pregnancy outcomes (e.g. maternal infections, miscarriage, birth weight, newborn health)?

16) Do you think mothers are healthier or sicker now than they were in the past? What has caused the changes?

17) Do you think babies are born healthier or sicker now than they were in the past? What has caused the changes?

گہرائی سے انٹرویو کے لیے عمومی رہنما خطوط

محقق باضابطہ طور پر شریک کو سلام اور خطاب کرے گا اور اس کا تعارف کرائے گا اور مطالعہ میں اس کے کردار کا۔ اپنا تعارف کرانے کے بعد، شرکت کنندہ کو اپنا تعارف کرانے اور باضابطہ انٹرویو شروع کرنے سے پہلے باخبر رضامندی فراہم کرنے کے لیے مدعو کیا جائے گا
بحث میں شریک کی شراکت رضاکارانہ ہوگی، اگر وہ اس بحث میں حصہ نہیں لینا چاہتے تو انہیں شرکت کرنے پر مجبور نہیں کیا جائے گا۔
گفتگو کو شرکاء کی اجازت سے آڈیو ریکارڈ کیا جائے گا۔
انٹرویو لینے والا مطالعہ کا مقصد شرکاء کو تفصیل سے بتائے گا۔ مزید یہ کہ انٹرویو لینے والا اس بارے میں کوئی تبصرہ نہیں کرے گا کہ آیا شریک صحیح ہے یا غلط۔ انٹرویو لینے والا بھی چیزوں پر الزام لگانے اور تنازعات میں ملوث ہونے سے گریز کرے گا۔

امیدوار

مقامی مقامی بچے پیدا کرنے والی ماؤں کے ساتھ گہرائی سے انٹرویوز (IDI) کیے جائیں گے جو کیٹیگری D ہسپتال پشاور میں زچگی کی صحت کے حصول کے لیے تحصیل سلارزئی، ضلع باجوڑKPK، سچوریشن حاصل کرنے پر مزید IDI کو روک دیا جائے گا

IDI کے لیے جگہ

شرکت کنندہ کی رضامندی کے بعد IDI کے انعقاد کے لیے مناسب جگہ اور وقت کا فیصلہ کیا جائے گا۔

ڈیٹا اکٹھا کرنا

محقق ایک اسٹڈی گائیڈ کا استعمال کرتے ہوئے شرکاء سے کھلے عام سوالات پوچھ کر IDI کے ذریعے ڈیٹا اکٹھا کرے گا۔ مطالعہ کی پائلٹ جانچ اسی طرح کی ترتیب میں رسمی IDI کرنے سے پہلے کی جائے گی۔

IDI کے لیے پیشگی شرائط

IDI شروع کرنے سے پہلے تمام شرائط کا بندوبست کیا جائے گا۔ اس میں انٹرویو گائیڈ، رضامندی کے فارم، ٹیپ ریکارڈر، بیٹریاں، اضافی ٹیپ ریکارڈر، اضافی بیٹریاں، مناسب سٹیشنری، اور اس بات کو یقینی بنانا کہ تمام آلات کام کر رہے ہیں شامل ہوں گے۔

تعارفی اسکرپٹس

السلام علیکم

میں آپ کے وقت کے لئے آپ کا شکر گزار ہوں؛ میں آغا خان یونیورسٹی، سکول آف نرسنگ اینڈ مڈوائفری میں گریجویٹ طالب علم ہوں۔ میں ماؤں کی غذائیت پر موسمیاتی تبدیلی کے اثرات پر ایک تحقیقی مطالعہ کر رہا ہوں۔ میں زچگی کی غذائیت اور اس کے بارے میں آپ کے ذاتی تجربات سے متعلق کچھ سوالات پوچھنے کے لیے آپ کا وقت نکالوں گا، انٹرویو کے دوران میں کچھ نوٹ بھی لوں گا

یہ ایک معیاری مطالعہ ہے اور اس بحث کا مقصد پاکستان کے ضلع باجوڑ میں موسمی، زچگی کی غذائیت، خوراک کی دستیابی، اور غذائی تحفظ سے وابستہ چیلنجوں کی نشاندہی کرنا ہے۔ شمالی علاقہ جات (فاٹا) باجوڑ میں ماؤں اور بچوں کو خاص طور پر مقامی آبادیوں میں، موسمیاتی تبدیلیوں کی وجہ سے غذائی تحفظ میں متوقع نقصانات سے پیچیدہ، مشکل اور کم سمجھے جانے والے خطرات کا سامنا ہے۔ یہ مقامی آبادی برف باری، انتہائی سرد درجہ حرارت، زندگی کی سرگرمیاں، صحت کی دیکھ بھال کی ضروریات اور زچگی کی صحت کی غذائیت کے لیے زیادہ خطرے سے دوچار ہیں، جن کا صحیح طریقے سے انتظام نہیں کیا جا سکتا۔ اس گفتگو سے اکٹھی کی گئی معلومات فیصلہ سازوں کو کلیدی خدشات سے نمٹنے کے لیے منصوبے تیار کرنے میں معاون ثابت ہوں گی۔

میں آپ کے تجربات اور نقطہ نظر کے بارے میں بصیرت حاصل کرنے کے لیے موسمیاتی تبدیلی اور خوراک کی دستیابی سے متعلق اپنے سوالات کی فہرست پر بحث کروں گا۔ میں آج آپ کے ساتھ تقریباً 45 منٹ سے 60 منٹ گزارنا چاہتا ہوں۔ میں شاید آپ کی کہی ہوئی تمام باتوں کو لکھنے کے قابل نہ ہوں، اس لیے آپ کی اجازت سے، میں گفتگو کو آڈیو پر ریکارڈ کرنا چاہوں گا تاکہ میں آپ کی کہی ہوئی ہر بات کو لکھ سکوں اور کچھ بھی نہ بھول سکوں۔ مطالعہ مکمل ہونے کے بعد، تمام ریکارڈ شدہ ڈیٹا کو حذف اور تباہ کر دیا جائے گا، اور میں اس بات کو یقینی بناؤں گا کہ آپ اس عمل سے مطمئن ہیں۔

تحقیقاتی سوال

- گاؤں پشات تحصیل سلارزئی، ضلع باجوڑ خیبر پختونخوا میں حمل کے دوران خوراک کی دستیابی پر

موسمیاتی تبدیلیوں کے اثرات کے بارے میں حاملہ مقامی دیہی خواتین کے خیالات کیا ہیں؟

• گاؤں پشات تحصیل سلارزئی، ضلع باجوڑ خیبرپختونخوا میں حمل کے دوران خوراک کی دستیابی پر موسمیاتی تبدیلیوں کے اثرات کے بارے میں حاملہ مقامی دیہی خواتین کے کیا تجربات ہیں؟

تھیم اور ذیلی تھیم کو دریافت کرنے کے لیے سوالات۔

نیم ساختہ گہرائی سے انٹرویو گائیڈ

موضوع 1: حمل کے دوران زچگی کے کھانے کے نمونے۔

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1- کیا آپ مجھے بتا سکتے ہیں کہ جب آپ حاملہ ہوتی ہیں تو آپ کس قسم کے کھانے کھاتے ہیں؟

2- کیا کوئی خاص چیز ہے جو آپ حمل کے دوران کھاتے ہیں؟ اگر ہاں تو آپ وہ چیزیں کیوں کھاتے ہیں؟

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3- کیا آپ حاملہ نہ ہونے کے مقابلے میں حمل کے دوران مختلف مقدار میں کھانا کھاتے ہیں؟

4- کیا حمل کے دوران مختلف اوقات میں آپ کے کھانے کی مقدار تبدیل ہوتی ہے؟

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5- حمل کے دوران کھانا کب سب سے زیادہ اہمیت رکھتا ہے؟ کیوں؟ (جیسے کہ کس سہ ماہی میں)۔

موضوع 2: غذائی تحفظ اور موسم

6- سال کا کون سا وقت زچگی کی بہتر غذائیت کا باعث بنتا ہے؟ یہ آسان کیوں ہے؟ کیا اس سیزن میں آپ کی ضرورت کی خوراک حاصل کرنے میں کوئی بری چیزیں ہیں؟

7- سال کا کون سا وقت زچگی کی خراب غذائیت کا باعث بنتا ہے؟ یہ کیوں مشکل ہے؟ کیا اس موسم کے بارے میں کوئی اچھی چیزیں ہیں جن کی آپ کو ضرورت ہے؟ اس موسم کو کیا آسان بنائے گا؟

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8- جب آپ کے پاس کھانا نہیں ہے، تو آپ خوراک کی کمی کو پورا کرنے کے لیے کون سی حکمت عملی استعمال کرتے ہیں؟ جب آپ حاملہ ہوتی ہیں تو کیا یہ حکمت عملی تبدیل ہوتی ہے؟

موضوع 3: خوراک سے متعلق گھریلو اخراجات

9) گھریلو آمدنی کا کتنا فیصد خوراک پر خرچ ہوتا ہے؟

10)۔ گھر والے کتنی بار تازہ پھل اور سبزیاں خریدتے ہیں؟

11) کیا گھر والوں کو مقامی بازار یا گروسری اسٹور تک رسائی حاصل ہے؟ اگر ایسا ہے تو، وہ کتنی بار اس کا دورہ کرتے ہیں؟

12)۔ کیا گھریلو آمدنی یا کھانے سے متعلق اخراجات میں کوئی موسمی اتار چڑھاو ہے؟

13) کیا حال ہی میں انتہائی سرد موسم میں خوراک کی قیمت یا خوراک کی دستیابی میں کوئی خاص تبدیلی آئی ہے؟

موضوع4: وقت کے ساتھ خوراک کی حفاظت اور زچہ بچہ کی صحت

14- غذائیت ماؤں کی صحت کو کیسے متاثر کرتی ہے؟

15- غذائیت حمل کے نتائج کو کیسے متاثر کرتی ہے (مثلاً زچگی کے انفیکشن، اسقاط حمل، پیدائش کا وزن، نوزائیدہ کی صحت)؟

16- کیاآپ کو لگتا ہے کہ مائیں ماضی کی نسبت اب صحت مند یا بیمار ہیں؟ تبدیلیوں کی وجہ کیا ہے؟

17- کیاآپ کو لگتا ہے کہ بچے ماضی کی نسبت اب صحت مند یا زیادہ بیمار پیدا ہوئے ہیں؟ تبدیلیوں کی وجہ کیا ہے؟

آپ کے وقت اور شراکت کے لیے آپ کا شکریہ

د ژوړې مرکې لپاره عمومي لارښوونې

څېړونکی به په رسمي توګه ګډون کونکي ته ښه راغلاست او وینا وکړي او په مطالعه کې به هغه او د هغه رول معرفي کړي. د خپل ځان د معرفي کولو وروسته، ګډون کوونکي ته بلنه ورکول کېږي چې خپل ځان معرفي کړي او د رسمي مرکې له پیل کولو دمخه د خبرتیا رضایت ورکړي. په بحث کې د ګډون کونکي وړه به داوطلبانه وي؛ که دوی نه غواړي په دې بحث کې برخه واخلي، نو مجبور نه شي چې ګډون وکړي. بحث به د ګډون کوونکي په اجازې سره په غږیز ډول ثبت شي. مرکه کوونکی به د مطالعې موخه په تفصیل سره ګډونوالو ته تشریح کړي. سربیره پردې، مرکه کوونکی به په دې اړه تبصره ونه کړي چې آیا ګډون کوونکی سم دی که غلط. مرکه کوونکی به د شیانو له تورولو او په شخړو کې له ښکیلتیا ځخه هم ډډه وکړ

کټګوری روغتون پشات ته د D به د ځایی کلیوالي کلیوالو میرمنو سره ترسره شي چې د (IDI) ژوړې مرکې IDI کې راځي ، د سیریشن ترلاسه کولو وروسته به نور KPK میندو روغتیا لپاره د تحصیل سالارزی ، ضلع باجوړ بند شي.

لپاره ځای د IDI

د ترسره کولو لپاره یو مناسب ځای او وخت به د ګډون کونکي له رضایت وروسته وټاکل شي IDI د

د معلوماتو راټولول

له لارې معلومات راټول کړي چې د مطالعې لارښود په کارولو سره ګډون کونکو ته خلاصې IDI څېړونکی به د ترسره کولو دمخه ترسره شي IDI پوښتنې وکړي. د مطالعې ازمایښت به په ورته ترتیب کې د رسمي.

لپاره د مخکینی اړتیاوې IDI

پیل کولو دمخه به ټول شرایط تنظیم شي. پدې کې به د مرکې لارښود، د رضایت فورمې، IDI د

ټیپ ریکارډر، بیټرۍ، اضافي ټیپ ریکارډر، اضافي بیټرۍ، کافي سټیشنري، او ډاډ ترلاسه شي چې ټول

.وسایل کار کوي

تعارفي سکریپټ

السلام علیکم

زه ستاسو د وخت لپاره مننه کوم؛ زه د آغا خان پوهنتون، د نرسینګ او قابله ګۍ په ښوونځي کې فارغ

شوی محصل یم. زه د میندو په تغذیه باندې د اقلیم د بدلون د اغیزې په اړه یوه څېړنه ترسره کوم. زه به ستاسو

د وخت په تیریدو سره د میندو د تغذیې او په دې اړه ستاسو د شخصي تجربو په اړه ځینې پوښتنې وپوښتم، د

مرکې پرمهال به ځینې یادښتونه هم واخلم

دا یوه کیفیتي څېړنه ده او د دې بحث هدف د پاکستان د باجوړ په ولسوالۍ کې د موسمي، د میندو

تغذیه، د خوړو شتون، او د خوړو خوندیتوب سره تړلې ننګونې په ګوته کول دي. په شمالي سیمو (فاټا) باجوړ

کې میندې او ماشومان په ځانګړې توګه د ځایي خلکو په منځ کې، د اقلیمي بدلون له امله د خوراکي توکو په

امنیت کې د متوقع زیانونو له امله د پېچلو، ستونزمنو او په ناسمه توګه د پوهېدو خطرونو سره مخامخ دي. دا ځایی خلک د واورې اورښت، د تودوخې خورا سړه، د ژوند فعالیتونو، روغتیایی اړتیاوو، او د میندو روغتیایی تغذیه ډیر زیان منونکي دي، چې په سمه توګه اداره نشي. د دې خبرو اترو څخه راټول شوي معلومات به د تصمیم نیونکو سره د مهمو اندیښنو سره د مقابلې لپاره د پالنونو په جوړولو کې مرسته وکړي

زه به د اقلیم د بدلون او د خواړو د شتون په اړه زما د پوښتنو لیست په اړه بحث وکړم ترڅو ستاسو تجربو او لیدونو ته بصیرت ترلاسه کړم. زه غواړم نن له 45 څخه تر 60 دقیقو پورې له تاسو سره تیر کړم. زه ممکن نه شم کولی چې تاسو ووېل شوي ټول ولیکم، نو ستاسو په اجازه زه غواړم هغه خبرې په آډیو کې ثبت کړم ترڅو زه وکولی شم هر څه چې تاسو ووېل او هیڅ شی هیر نکړي. د مطالعې پای ته رسیدو وروسته، ټول ثبت شوي معلومات به حذف او ویجاړ شي، او زه به ډاډ ترلاسه کړم چې تاسو د پروسې څخه راضي یاست..

د څېړنې پوښتنه:

د خپښ پښتونخوا د باجوړ ضلعې په پاشت تحصیل سالارزو کلي کې د امیندواری اصلي کلیوالي میرمنو د حمل پرمهال د خوراکي توکو په شتون باندې د اقلیم د بدلون د اغیزو په اړه نظرونه څه دي؟

- د خپښ پښتونخوا باجوړ ضلعې د پشتون تحصیل سالارزو په کلي کې د امیندواره کلیوالو میرمنو تجربې څه دي چې د امیندواری پرمهال د خواړو په شتون باندې د اقلیم د بدلون اغیزې دي

.د موضوع او فرعي موضوع سپړلو لپاره پوښتنې

نیمه جوړ شوی د ژوړې مرکې لارښود

موضوع 1: د امیندواری پرمهال د میندو د رژیم نمونې

1- ایا تاسو ماته بتان کولی شئ چې کله تاسو حامله وي نو ستاسو د قسم خوراک خوړل کیږي؟

2- کومه خاصه خبره ده چې د حمل په دوران کې به څه وي؟ که نه، تاسو ته هغه څه سبب شوي دي؟

-

3- د مختلفو مقدارونو په خوړلو کې د حمل په وخت کې ستاسو حامله نه کېدل؟

4- د حمل په دوران کې په مختلفو وختونو کې ستاسو د خوراک اندازه بدلیږي؟

5- د حمل په دوران کې د کب تر ټولو زیات خوراک؟ ولې؟ (لکه څنګه چې په سه مایی کې)

~~دوهمه موضوع: د خوړو خوندیتوب او فصل~~

-6- سال کا کون سا وخت زچگی کی بهتره غذایی کا بنتا ده؟ دا آسانه ولې؟ ایا په دې سیزن کې ستاسو د

خوراک څښاک ترلاسه کول په کوم بری حالت کې اړین دي؟

7- سال کا کون سا وخت زچگی کی خرابی خرابی کی بنتا ده؟ دا ځکه مشکل دی؟ د دې موسم په اړه څه ښه

دي چې تاسو ته اړتیا لرئ؟ د دې موسم کوالی شي آسانه کړي؟

8- کله چې ستاسو پاس خواړه نه وي، نو تاسو ته د خوراک کمښت پوره کولو لپاره د کون سی حکمت عملي کارول بې؟ کله چې تاسو حامله وي نو دا حکمت عملی بدلیږي؟

دریمه موضوع: د خوړو اړوند د کور لګښتونه

9) د کورنۍ د عاید څومره سلنه په خوړو مصرفیږي؟

10). کورنۍ څو ځله تازه میوې او سبزیجات اخلي؟

11) ایا کورنۍ محلي بازار یا د خوراکي توکو پلورنځي ته لاسرسی لري؟ که داسې وي، دوی څو ځله لیدنه کوي؟

12). آیا د کورنۍ په عاید یا د خوړو په لګښتونو کې کوم موسمي بدلونونه شته؟

13) ایا په دې وروستیو کې په خورا سړه هوا کې د خوراکي توکو په قیمت یا د خوړو په شتون کې کوم د پام وړ بدلون راغلی؟

څلورم موضوع: د وخت په تیریدو سره د خوړو خوندیتوب او د مور او ماشوم روغتیا

14- غذائیت مری کی روغتیا څنګه ناروغه کیږی؟

15- د زیان رسوونکو حملاتو پایلې، څنګه ناروغه کیږي (مثلاً زچګی د ناروغی، اسقاط حمل، د زیږون وزن، نوزائیده روغتیا)؟

16- تاسو ته داسې ښکاري، چې د ماضی په حال کې صحت مند یا بیمار دي؟ بدلونونه څه دي؟

17- تاسو ته داسې ښکاري چې د ماشومانو د ماضی د زړه او یا ډیر بیمار پیدا کیږي؟ بدلونونه څه دي؟

ستاسو د وخت او ونډې لپاره مننه

Appendices J Demographic Profile of Participants

Demographic Profile of Participants

Study Title: impact of climate change on maternal nutrition during pregnancy among indigenous rural women Bajaur, Pakhtunkhwa, Pakistan.

Study Participants ID: _____

Interview Date: _____

Interview start time: _____

Interview end time: _____

Contact: Ihsan Ullah, Master Scholar in Nursing

The Aga Khan University, School of Nursing and Midwifery (AKU-SONAM) Mobile: 03088410801

General Demographic Information

Age: ☐ years

Level of Education: ☐ No formal education ☐ Primary education

☐ Secondary Education ☐ Intermediate ☐ Diploma/Degree

Occupation: _____

Religion: _____

Marital Status: ☐ Married ☐ Unmarried

Years of marriage: _____

Number of children: _____

Total Household Income: _____

Type of family: ☐ Joint Family ☐ Nuclear Family

Appendices K Demographic Profile of Participants (Urdu)

شرکاء کی آبادیاتی پروفائل

مطالعہ کا عنوان: "دیہی باجوڑ، خیبر یختونخواہ، پاکستان میں موسمیاتی تبدیلی (سرد موسم) میں زچگی کی غذائیت کے ساتھ مقامی خواتین کے تجربات: زچگی کے بچوں کی صحت پر مضمرات

مطالعہ کے شرکاء کی شناخت:

انٹرویو کی تاریخ:

انٹرویو شروع ہونے کا وقت:

انٹرویو کا اختتامی وقت:

رابطہ: احسان اللہ، نرسنگ میں ماسٹر سکالر
آغا خان یونیورسٹی، سکول آف نرسنگ اینڈ مڈوائفری
(AKU-SONAM) موبائل: 03088410801

عمومی آبادیاتی معلومات کی عمر: سال

تعلیم کا معیار:

☐ کوئی رسمی تعلیم نہیں

☐ پرائمری تعلیم

☐ میٹرک تک تعلیم

☐ انٹرمیڈیٹ

☐ ڈیلومہ/ڈگری

پیشہ:

مذہب:

ازدواجی حیثیت: ☐ غیر شادی شدہ ☐ شادی شدہ

شادی کے سال:

بچوں کی تعداد:

کل گھریلو آمدنی:

خاندان کی قسم:

جوائنٹ فیملی:

انفرادی خاندان:

Appendices L Demographic Profile of Participants (Pashto)

د ګډون کوونکو ډیموګرافیک پروفایل

د مطالعې سرلیک: د امیندواری پرمهال د مینډو په ټغټیه باندې د اقلیم د بدلون اغیزې د باجوړ ، پښتونخوا، پاکستان د کلیوالو میرمنو ترمنځ.

د مطالعې برخه اخیستونکي پیژندنه_____

د مرکې نېټه_____

د مرکې پیل وخت _____

د مرکې پای وخت _____

اړیکه: احسان الله، د نرسنګ ماسټر سکالر

موبایل: 03088410801 (AKU-SONAM) د آغا خان پوهنتون، د نرسنګ او قابله ګۍ ښوونځی

عمومي ډیموګرافیک معلومات

عمر:_____ کلونه

د زده کړې کچه:

رسمي زده کړې نشته ☐

لومړنی زده کړې ☐

ثانوي زده کړې

منځګړی

ډیپلوما/ درجې

دنده_____

دین_____

مدني حالت:

واده شوی ☐

بې واده ☐

د واده کلونه_____

د ماشومانو شمېر_____

د کورنی ټول عاید_____

د کورنی ډول_____

ګډه کورنی_____

اتومي کورنی_____

Appendices M Affidavit for Translation

AFFIDAVIT FOR TRANSLATION

I, *IHSAN ULLAH* am fluent in Pashtu and English.

I hereby certify, to the best of my knowledge, the document(s) listed below and attached to this affidavit is true and accurate translations of the original document in English into Pashtu.

Name of Original Document in English	Version
Experiences of Indigenous rural women during their pregnancy, Bajaur KPK, Pakistan (Consent Form for In-depth Interview).	1
Study Guide for In-depth Interview	1

Name of Translated Document in Pashtu	Version
د امیندوارۍ پر مهال د خایي کلیوالو ښځو تر منځ د میندو په تغذیي باندې د اقلیمي بدلون اغیز، باجور KPK، پاکستان (د ژوري مرکي لپاره د رضایت فورمه).	1
د ژوري مرکي لپاره د مطالعي لارښود	1

IHSAN ULLAH — Printed name of Translator

Signature of Translator

23th February 2023 — Date

Dr. RAFAT JAN — Printed Name of Principal Investigator

Signature of Principal Investigator

23th February 2023 — Date