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Harvesting health: Indigenous mothers' resilience in the face of climate change and maternal nutrition challenges in Rural Bajaur, Pakistan

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Proposal

"Harvesting Health: Indigenous Mothers' Resilience in the Face of Climate Change and Maternal Nutrition Challenges in Rural Bajaur, Pakistan"

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INTRODUCTION

1.1 Background

Significant global health issues linked to climate change have recently risen to the top of the global health agenda. Numerous studies have established the link between climate change and human health, emphasizing that poverty, food insecurity, isolation from other people and places, and deteriorating social norms are major elements that amplify climate change's adverse effects. Around 1.3 billion individuals live in low- and middle-income countries (LMICs), out of which 70% are females (Kuehn & McCormick, 2017). Climate change has adversely affected women's health particularly in regard to pregnancy, growing fetus, newborn's health, and maternal and newborn's nutrition. (Bryson et al., 2021).

The most northern regions of the world are experiencing an increase in the frequency and severity of extreme snowfall and blizzards, which has impacted women's capacity to search for and gather food for their families as part of their major caregiving obligations in the communities (A. Bunce & Ford, 2015). Direct health impact costs related to climate changes are predicted to be in the \$2 to \$4 billion range yearly by 2030. Areas with weak health infrastructure, which are primarily found in underdeveloped countries, will be least able to handle without assistance to plan and respond to climate change related health issues. Just from malnutrition, malaria, diarrhea, and heat stress, climate change is expected to cause an additional 250,000 deaths every year between 2030 and 2050 (Desai & Zhang, 2021).

1.2 Geographical location

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Pakistan is bounded to the west by Iran, to the northwest and north by Afghanistan, to the northeast by China, and to the east and southeast by India. The Arabian Sea coast forms its southern border. Pakistan has most populous multiethnic nation (Asif et al. 2003). Pakistan consist of four provinces mainly Sindh, Punjab, Baluchistan and Khyber Pakhtunkhwa. There are several different agro-ecological in Pakistan, including irrigated plains and high mountain valleys. Environmental factors like temperature, nutritional content, soil characteristics, and rainfall have a considerable impact on a crops' performance (Asif et al. 2003). In Pakistan's northern regions, subsistence farming and small-scale land ownership are common. In high mountain valleys and terrains wheat, which is farmed in both the single cropping zone and the double cropping zone (up to 1800 meters), is the main cereal crop.

Pakistan is located at the boundary of a wet-dry monsoonal system. In general, precipitation is unpredictable and variable in volume across the country. The rainy monsoon winds blow in sporadic bursts, mostly during summer season. The exact margins of these winds change from year to year. Although they are unpredictable in nature, tropical storms from the Arabian Sea bring precipitation to the coastal regions (Khan & Ahmad et all 2016). Extreme seasonal and daily temperature changes are a feature of Pakistan's central climate. The freezing, snow-covered northern mountains' high elevations change the region's climate. The northern parts of Khyber Pakhtunkhwa have slightly higher temperatures. Sea winds also change the climate along the coast (khahro et al.2015).

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(Image source Wikipedia)

Figure 1: map of Khyber Pakhtunkhwa (KPK), a province of Pakistan))

1.3 District Bajaur

Bajaur District is located at a high elevation to the east of the Kunar Valley. The location of the Bajaur district is given in figure 2 (Younis, Ahmad, & Asghar 2021). Located near Pakistan and Afghanistan border, Bajour is about 72 km long and 32 km wide land surrounded by rocky hills near Kunar Valley., Bajaur has extreme weather. Winter season which is from November till March is extremely cold and freezing... June through August are the hottest months in Bajaur. Fresh water flows from many springs and streams across the area, creating a possible source of irrigation and drinking water. In the Bajaur region, mud is primarily used to build houses. In their native language, these houses are typically named “Qila” which means, fortresses and multiple dwellings inside. Mostly joint family systems exist in the district . (Khan, R., Sadam, & Mahmood, S. 2021).

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(figure 2: Map of Bajaur district in KPK, Pakistan FATA/Facebook) (Snowfall in Bajaur Source from Dawn)

Mostly Extreme winter temperatures of below zero degree centigrade create huge challenges specially for women's and infant health. These indigenous women are unable to avail of health services in freezing rain and heavy snowfall.. These indigenous populations face complex, difficult, climate change related food insecurity, and maternal and child mal-nutrition. Few quantitative research have focused on the seasonality of nutrient consumption during childbearing ages. Little is known about the processes through which climatic variation affects food security and nutrition for this population. Climate change related frequent snowfall and extreme freezing temperatures may result in food shortages and an increase in food prices. This can lead to malnutrition and hunger, which negatively impacts maternal-infant health. This study will investigate and characterize how indigenous women in rural Bajaur are vulnerable to climate change, how these women perceive the environmental effects on seasonal variation and related changes in food security and overall effects on maternal-infant health in regard to climate change . Food security refers to the availability of sufficient amounts of healthy, easily available food for individuals and households (World Food Summit, 2022). Changes in temperature, precipitation,

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and extreme weather patterns that have an impact on crop yields, agricultural pests, and diseases are some of the main issues with food security. (*The State of Food Security and Nutrition in the World 2017*)

Understanding how food security may affect human nutrition and health because of climate change is crucial. Women in low-resource communities are more likely to experience negative health outcomes as a result of climate change (Costello et al., 2009). For many women in low-resource locations, obtaining optimum nutrition during pregnancy might be difficult due to poor food access and availability. Losses in food security brought on by climate change are also projected to complicate this conflict. It is common knowledge that weather and climate can have an impact on food security, but it is vital to understand the processes and pathways by which these factors operate during the perinatal period (Dewing et al., 2013).

Climate change can directly worsen maternal malnutrition. Unpredictable temperatures and rainfall have a severe influence on farmers' ability to provide food for their markets and households. The inability to provide nourishing food and the loss of livelihood are two effects of climate-induced migration. Extreme weather conditions and agricultural yields have an impact on the average supply of essential minerals, including calcium, folate, thiamine, and pyridoxine, which are crucial during pregnancy (Das & Mishra, 2022). For landlocked nations experiencing food shortages, a single extreme weather event can reduce the average annual nutrient supply by up to 76%. By upregulating the production of carbon-dense micronutrients like vitamin C at the expense of other minerals like zinc, iron, and protein, elevated amounts of atmospheric carbon dioxide can also alter the nutritional composition of edible plants (Das & Mishra, 2022).

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Bajaur is a hilly area where extreme temperatures and snowfall affect the indigenous population. Understanding these relationships will be essential to support the mother and child's well-being in a changing environment and supporting climate-changing solutions (Watts et al., 2015)

1.2 Significance of the Study

extensive literature review has revealed that the issue of climate change related food insecurity that affects maternal health is less explored in the Pakistani context. This research is significant as it will help to explore the understanding of climate change on the food availability and security that directly and indirectly affects maternal-infant health outcomes. The study will also identify the factors that are obstacles and challenges to women's health. In addition the findings of the study will help local health authorities to provide a tangible solution for the current climate change related food security issues related to maternal and infant health. Furthermore, this research will pave a way for future research studies to further explore and /or mitigate the effects of climate change on maternal health in cold hilly areas of Pakistan where the population is more vulnerable to climate change.

1.3 Purpose of the Study

The purpose of the study is to explore the experiences of maternal women regarding maternal nutrition due to climate change in Rural Bajaur, Khyber Pakhtunkhwa Pakistan.

1.4 Research Questions

- What are the experiences of indigenous maternal women regarding the effect of climate change (extreme temperature) on food availability during pregnancy in village Pashat Tehsil Salazar, district Bajaur Khyber Pakhtunkhwa?

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- What are the challenges to indigenous rural maternal women regarding the effect of climate change (extreme temperature) on food availability during pregnancy in village Pashat Tehsil Salarzai, district Bajaur, Khyber Pakhtunkhwa?

2.0 LITERATURE REVIEW

Climate change increases the frequency and intensity of extreme weather events, including heavy snowfall and snowstorms in the most northern parts of the world, which affects women's ability to find and collect food for their families, as part of their primary caretaker roles in the communities (Anna Bunce et al., 2016). Women were more affected by nutritional deficiencies, such as mal nourishment and anemia, due to food insecurity (Wheeler & Von Braun, 2013) (Hlimi, 2015) (Patterson et al., 2017). Pregnant women were more likely to experience hypertension, exhaustion, miscarriages, and stillbirths with higher temperatures and food insecurity (Rylander et al., 2013). Additionally, the World Health Organization (WHO) has emphasized the significance of gender, health, and climate change and provided measures for mitigating the climate change related health concerns (WHO, 2014; (Wheeler & Von Braun, 2013).

The effects of climate change on maternal health also have an impact on birth outcomes and infant health, raising the demand for medical treatment. According to reports, exposure to extremely low temperatures during pregnancy can increase the risk of birth abnormalities in a number of different climate zones throughout the world (Ren et al., 2022). Climate change related extremely cold weather adds to rural indigenous women living in mountainous areas where they already have restricted access to health services. Due to societal and cultural

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issues, women experience healthcare access inequality more often than men globally (A. Bunce & Ford, 2015). Women worry more about climatic change and the negative impacts of climate change on the next generation since they typically take care of others (Anna Bunce et al., 2016). Due to absence of educational options, the scarcity of career opportunities, and the lack of participation in financial decision-making, women are more susceptible to climate change related health issues. If they do not have access to education and work, which is a critical enabling element for adaptive adjustments at the personal and societal levels, women may not have access to knowledge that could raise their awareness of the implications of climate change (Springmann et al., 2016). After a thorough literature search, no such study has been done in Pakistan; this will be the first study of its kind. The findings will be shared with the government and relevant authorities to help them plan road map for mitigating climate change related maternal and infant health related food insecurity.

2.1 Theoretical Framework

Resilience theory will be utilized for this research study. According to Daniel (2011), Holing introduced the concept of resilience theory in 1973. The author noted that the theory determines the persistence of relationships within a system and is a measurement of these systems' capacity to withstand changes in state, driving variables, and parameters while continuing to function. and the resilience theory has been adopted by environmental health, psychology, philosophy, and others scientific fields. Strengths are emphasized over weaknesses in the resilience theory, and it incorporates important contextual elements into its design. The interactions between the developing individual and their social and physical settings are highlighted. According to Masten, Best, and Garnezy (1990), it is the procedure, capacity, or result of successful adaptation in the face of difficult or dangerous conditions. To

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examine the difficulties indigenous people in rural Bajaur face to overcome the effects of climate change, the idea of resilience serves as a useful tool. By incorporating resilience theory into the current study, the researchers will be able to determine how vulnerable the communal lands of the pashat are and determine if the community's members are able to bounce back from the consequences of climate change. It is necessary to focus this research on this region since rural Pashat is one of the rural communities in district Bajaur that is impacted by climate change-related snowfall and heavy rainfall.

2.2 Conceptual framework and approach to research

Berrang-Ford et al (2021) suggested a conceptual framework will be utilized to understand how climate change affects mother-infant health. This concept emphasizes that heavy snowfall, cold temperatures, and heavy rainfall affect agriculture, and crop yield causing food insecurity, which directly affect maternal-infant health.

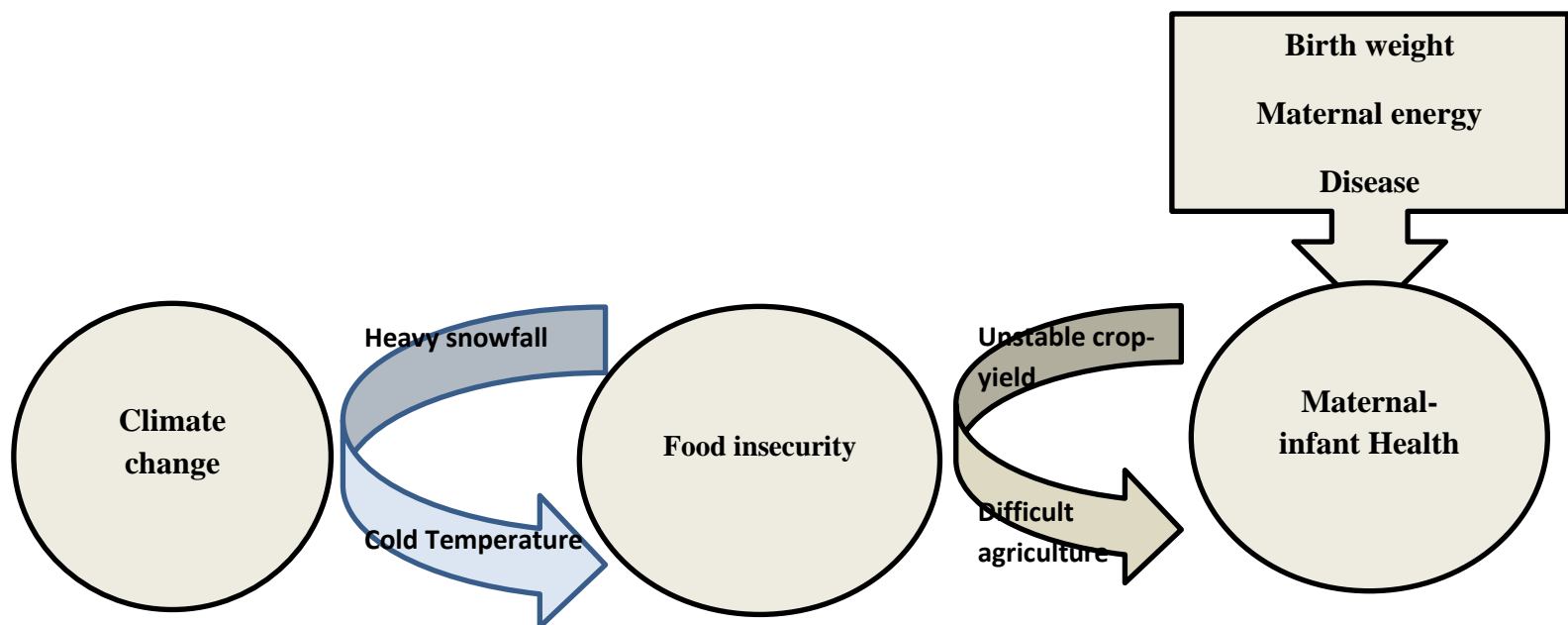


Fig 3. Conceptual framework highlighting factors affecting climate risk in rural Bajaur.

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2.4 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 climate change 2015)
- **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”. (World Food Summit, 1996)
- **Food availability:** The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid). (World Food Summit, 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 such as access to common resources). (World Food Summit, 2022)

METHODOLOGY

3.1. Study Design

This qualitative study will be conducted by using a descriptive exploratory research design. This design is considered appropriate to explore and collect in-depth data regarding the perceptions and experiences of women about the effect of climate change on their nutrition during their childbearing ages. Furthermore, the study design will also support the researchers to understand the experiences and knowledge of women associated with the phenomenon under

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study (Polit & Beck, 2012). Since individuals' perceptions and experiences vary from person to person, the proposed design helps gain an in-depth understanding of individual experiences.

3.2 Study Setting

The study will be conducted in a public sector Rural Health Center (RHC) called "Category D hospital" in Pashat, district Bajaur.. It is a hilly area of Bajaur where snowfall and seasonal variation badly affect people's lives. . The population of the community is indigenous rural people, which mostly work as a farmer and laborers. The RHC is a 60-bed hospital established in 1995. There is a separate outpatient department (OPD)of Obstetrics and Gynecology (OBGYN) where inpatientsand outpatients are assessed regularly. The OBGYN physicians routinely assess nearly about 30-35 patients per day. Out patient services includeantenatal and postnatal care as well as routine neonatal vaccination. . In the winter seasons, the proportion of patients coming to OPD decreases because of cold weather and transport issues due to snowfall. In the summer season, the flow of patients increases. This hospital has been chosen because of easy accessibility to study participants who visit the RHC regularly.

Study Duration

This study will be conducted within 06 months after the Ethical Review committee approval from Aga Khan University.

3.3 Study Participants.

The study participants will be indigenous maternal women who visit OPD of RHC. To achieve the aim of the study, this qualitative study will employ a purposeful sampling strategy to recruit eligible study participants. In the qualitative inquiry, the intent of the researcher is not to

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generalize, but rather to develop an in-depth exploration to understand the phenomenon of interest (Burns, Grove, & Gray, 2013). Following is the inclusion and exclusion criteria for the study participants

3.5.1 Inclusion Criteria

- Married women with at least one pregnancy one child and who have experienced food security issues during cold weather and are willing to participate.

3.5.2 Exclusion criteria

- Those Mothers, who are mentally impaired, have other diseases, or are not willing to participate.
- Those women who have not given any birth.

3.4 3.6 Ethical considerations

The ethical issues in the study regarding anonymity, autonomy, and participant confidentiality will be ensured.

- The study will be conducted only after the approval of the ethical review committee (ERC) from Aga Khan University (AKU), and an official permission from the Medical Superintendent (MS) of the Category D hospital in Pashat district Bajaur.
- Written or verbal consent will be obtained from participants before the data collection and confidentiality will be maintained. The participants will have the right to withdraw from the study at any point in time of the research.

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- Specific code numbers will be allocated to study participants for maintaining their anonymity, throughout the study period. The researcher will also communicate the same to study participants
- The research data will be kept confidential in a secured place and only the primary researchers will have access to it. Furthermore, the data stored in the computer will be secured by using a password. The data will be discarded as per AKU/s data disposal policy.

For participants's comfort the researcher will have a female nurse for each interview. 3.7 Data Collection Process

Data collection will be carried out after seeking approval from the Ethics review committee of AKU, Karachi Pakistan. A study guide will be used for data collection. This is an in-depth interview questionnaire with open-ended and semi-structured questions to get extensive information from the participant (Please refer appendix D). Hunter et al. (2019) suggested that before taking the interview, it should be noted that the time and location are convenient for participants. Before conducting an interview, the researcher will obtain permission from the participants and then determine the participant's degree of comfort (place and time) in conducting the interview. Prior to actual data collection pilot testing of the interview guide will be carried out. Finalized interview guide will be utilized for the interviews. The interview guide will be in Pushto, the native language of the participants. Participants' interviews will be face-to-face after obtaining individuals' written or verbal informed consent (Refer to Appendix A, B, and C). The researcher will conduct the interview in the participants native language i.e. Pashtu in order to understand the in-depth understanding phenomena. Each participant will be interviewed for around 40 to 60 minute . However,

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if a participant takes more time, it will be allowed. The total time duration for each interview will be noted to know the variation and to know the average of all the interviews as this data is required for the dissemination of research findings. The data will be audio recorded as well as field paper will be used to record the data.

Data collection will be from 12-16 participants or until saturation is achieved. Doyle et al. (2020) in qualitative research, data saturation is the gold standard for sample size.

4. DATA ANALYSIS

Data analysis will be done manually and simultaneously along with data collection (Polit & Beck, 2012). The transcript's interpretation will be done by using the steps of participant analysis given by Creswell (2014). Following will be the process for the analysis

4.1 Thematic analysis:

For the data analysis, "thematic analysis" will be utilized. Thematic analysis is the most standard type of analysis in qualitative research, according to Guest, Namey, and Mitchell (2012). It underlines identifying, evaluating, and documenting patterns or themes within data. Thematic analysis will be done via six steps. The analysis of the data started first with the organization of the available information collected through in-depth interviews and field notes. The interview audiotapes will be listened to several times to understand the participant's views (Creswell 2014). To ensure that the accurate data is not lost during the transcription and translation process, the

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interview guides and transcripts will be translated into English and then back into Pashtu. In case of having no equivalent meanings in English, Pashtu words will be kept and utilized as they are in the recorded data. Familiarization with the data will be carried out by accurately reading and rereading the transcribed data as well as the field notes (Rice & Ezzy., 1999). The verbatim of each interview which gives similar meanings, will be labeled with a common code. During this process, the researchers connected back and forth to the audiotapes as and when required (Creswell 2014). the next step will be development of consensus on categorization of coded data according to emerging common themes and sub themes Similarly, the same categories will be merged into separate themes, to make the data more significant and concise (Creswell 2014).

Data and examples will be categorized according to the themes and subthemes. Data interpretation will then be carried out, under the guidance of the supervisor and committee members, In the final step of the data analysis, the researcher will display the results in table form, mentioning themes, categories, and enriched quotations of the participants.

5. STUDY RIGOR

The study will follow the reliability criteria proposed by Lincoln and Guba (1985), which is composed of credibility, dependability, and conformability and transformability.

5.1 Credibility

Credibility in the qualitative study is to examine the true value of the study (Lincoln & Guba, 1985). The credibility will be maintained through member checking, in which the researcher will request the study participants to read their transcripts and confirm that whatever information they shared, has been included in the transcripts. Credibility can also be improved by taking an appropriate sample size. Moreover, the participant's non-verbal expressions will also

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be observed and documented in the researcher's field notes to ensure the rigor of the study. The study participants will be encouraged to share their perceptions openly, and the questions will be explained in Pashtu language.

5.2 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. The analysis can be done twice so that the researcher can assess how well the responses addressed the research questions.

5.3 Conformability

Confirmability is used to determine how well the collected data corroborates the study's findings. The relationship between the data collected and the study results are connected to the reliability component. (Miles, Huberman, & Saldana, 2019). The confirmability will be maintained through the sharing of , codes, categories, and themes with the supervisor and committee members for verification. Moreover, besides a detailed methodology, an elaborated analysis of the findings will be provided to facilitate the reader to compare themes and participants' quotations

5.4 Transferability

The term "Transferability" refers to how broadly the research's findings can be applied to different contexts and fields. In-depth participant interviews will be conducted, and the researcher will offer a concise overview of the study's conclusions that may be used in situations that are similar (Miles, Huberman, & Saldana, 2019).

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