A STUDY ON CLIMATE CHANGE AND LIVELIHOOD ADAPTATION FOR COSTAL-BASED COMMUNITY PEOPLE

Especially Focusing on Climate Refugee and Ethnic Minority and
Local Surrounding Vulnerable Communities
in Khuruskul and Chowfaldandi Areas of Cox's Bazar Sadar

PHALS
PROGRAMME FOR HELPLESS AND LAGGED SOCIETIES

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Programme for Helpless and Lagged Societies (PHALS), Cox's Bazar

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Message from Excutive Director

On behalf of PHALS (Programme for Helpless And Lagged Societies),Cox'sBazar I would like convey my heartiest gratitude to the Malteser International for supporting us to carryout the intensive Study on climate change and livelihood adaptation for costal-based community people living coastal belt of Cox'sBazar Sadar Upazila. Which was focusing on 185 households of climate Refugee/Climate hit-families mainly women, Persons with disabilities, single mother living in Khurushkul Union "Ashrayan Project" and Sea dependent Ethnic Minority of Chowfaldandi union in riverine of Moheshkhali channel located at the south-eastern coast of Bay of Bengal under Cox'sBazar Sadar Upazila. For carryout the research task I also like to appreciate Associate Professor Mr. Md.Moniruzzaman Khan P.H.D and his team from Institute of Disaster Management & Vulnerability Studies of Dhaka University. The main objective of the study was also a knowledge based approach to deal with development, poverty alleviation, inclusion, other social issues in terms of Climate Change and anticipatory action for sustainable livelihood.

The study report that the team provided is a comprehensive one and also tried to highlight the opportunity and challenges as well. I do believe it is very import for any development agencies /organization for pre-intervention assessment/survey as far as sustainability and expected outcomes are concern. I also believe that end of the day our multi years project "Resilience Strengthening of Vulnerable Populations in Northern, Western & Eastern Bangladesh through a Network approach of 5 Organizations" will be able to create a positive change in the existing life style of targeted project partners/beneficiaries through providing AIG support, entrepreneurship development skill base training, value chain analysis, market linkage and anticipatory DRR initiatives etc. On the other hand without holistic approach it'll also a bit challenging in terms of having cordial cooperation and support from key stakeholders. This study presents multidimensional case studies and the lesson learns from community, identifying challenges and suggested solutions.

I hope this study book will encourage a wide exchange of experiences and lead to the development of new strategies for alleviating vulnerabilities of targeted communities living Khuruskul & Chowfuldandi unions under Sadar Upazila of Cox'sBazar.

Abu Murshed Chowdhury
Executive Director (Honorary)
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The survey research team would like to express their heartfelt gratitude to PHALS for the opportunity to be involved in conducting the baseline study on "Climate change and livelihood adaptation for climate refugee resettler communities and Rakhain ethnic minority in Cox's Bazar district, Bangladesh." We extend our sincere appreciation to Mr. Abu Murshed Chowdhury, Executive Director, PHALS, Among Marma, Chief Program Coordinator, Project Coordinator, BMZ-PT Projects PHALS and all team members of PHALS, for their unwavering support and cooperation throughout the study. Also thanks to the field staffs of PHALS who took all the pain and organized field visits. The team is especially grateful to UNO, Cox's Bazar Sadar who made access to the research setting easier and accessible whenever and where we needed.

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We sincerely appreciate the collective efforts and support received throughout the study, which has significantly contributed to the successful completion of this research endeavor.

With kind regards to all of the above,

Mohammed Moniruzzaman Khan, Ph.D.
Muhammad Awfa Islam
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Dhaka, June 2023

ABBREVIATIONS AND ACRONYMS

CPP	Cyclone Preparedness Programme
FGD	Focus Group Discussion
ICT	Information & Communication Technology
IGA	Income Generating Activities
KII	Key-Informant Interview
MI	Malteser International
NGO	Non-Governmental Organization
P-FIM	People First Impact Method
PHALS	Programme for Helpless and Lagged Societies
PWD	Persons with Disabilities
UDMC	Union Disaster Management Communities
WASH	Water, Sanitation and Hygiene

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EXECUTIVE SUMMARY

This report presents the findings of a comprehensive study conducted in the coastal region of Bangladesh, focusing on the Khuruskul and Chowfaldandi areas of Cox's Bazar Sadar, Cox's Bazar. These areas have been identified as climate change hotspots due to their unique geographical features, high population density, and limited adaptation capacity. The study aimed to assess the impacts of climate change on vulnerable communities, specifically climate refugees and ethnic minorities, and propose effective adaptation strategies.

In response to the urgent challenges faced by vulnerable populations in northern, western, and eastern Bangladesh, PHALS (Programme for Helpless and Lagged Societies), a local Non-Governmental Organization (NGO), implemented a project entitled "Resilience Strengthening of Vulnerable Populations in Northern, Western, and Eastern Bangladesh through a Network Approach of 5 Partner Organizations." Supported by Malteser International (MI) from Germany, this project aimed to enhance the adaptive capacity and resilience of resettled and ethnic minority communities in the Khuruskul and Chowfaldandi unions, situated in the Sadar Upazila of Cox's Bazar district, Bangladesh.

The primary objective of this study was to investigate the impacts of climate change on the livelihoods of coastal-based communities, with a specific focus on climate refugees and ethnic minorities in the Khuruskul and Chowfaldandi areas of Cox's Bazar. Employing a mixed-methods approach, the study sought to collect high-quality data to identify various issues related to climate change and livelihood adaptation, including the types and effects of disasters, vulnerability assessments, sequences of climate changes and their probability of impact, adaptation strategies of the local vulnerable community, and the potential for creating sustainable livelihood opportunities in the coastal area.

The study encompassed an in-depth exploration of climate change and its implications for the targeted vulnerable communities. A mixed-methods approach was employed, combining quantitative surveys and qualitative data collection methods to obtain comprehensive and nuanced insights. The study involved consultations with individuals, households, diverse actors, and partner agencies operating in the project area.

The key findings of the study reveal the disproportionate and differential impacts of climate change on the selected population. Although the impacts varied, the majority expressed deep concern about the changing climate and its adverse effects on their livelihoods. However, the current climate change adaptation measures implemented by both the government and non-government organizations were found to be grossly inadequate.

A critical gap identified in the study was the lack of livelihood protection, promotion, diversification, and transformation interventions. These communities urgently require support to safeguard their existing livelihoods and explore new income opportunities. Recommendations include increased investment in climate adaptation and mitigation strategies, tailored to the needs of the most vulnerable communities. Furthermore, the study highlighted the need for a range of training

programs focused on women and socially excluded groups, such as ethnic minorities and persons with disabilities. These programs would aim to enhance their skills and income-generating capacities in various sectors, including handicraft, boutique, parlour skills, tourism and hospitality management, tailoring, ICT, and livestock rearing.

The study also emphasized the importance of addressing social cohesion issues, particularly the lack of unity between climate migrants and the local community, as well as between the Rakhine and Muslim communities. Immediate attention from political representatives is needed to bridge these social divisions and promote harmonious relationships.

In conclusion, urgent action is required to address the multifaceted challenges posed by climate change in the coastal region of Bangladesh. By implementing the recommended measures, including the adoption of the PHALS framework and the proposed methodologies, the government, non-government organizations, and relevant stakeholders can effectively mitigate the impacts of climate change and contribute to the sustainable development of coastal communities in Bangladesh.

1. INTRODUCTION

1.1 Background of the Study

Bangladesh, situated in South Asia, has been grappling with the adverse effects of climate change for several decades (Ahmed, 2016). The country's unique geographical features, including its low-lying coastal areas and extensive river systems, make it particularly vulnerable to the impacts of global warming (Hossain et al., 2019). With a population density among the highest in the world, Bangladesh faces numerous challenges in adapting to the changing climate and protecting the well-being of its people (IPCC, 2014).

The coastal belt of Bangladesh, stretching along the Bay of Bengal, is a region that has been consistently battered by cyclones, extreme weather events, and storm surges (Farid and Nasreen, 2023; Kundu et al., 2020). These climatic hazards have been a recurring threat to the lives and livelihoods of the coastal communities, leading to the loss of homes, agricultural lands, and valuable assets (Akter et al., 2018). With the increasing impacts of climate change, these events have become more frequent and intensified, amplifying the vulnerability of the coastal population (Haque et al., 2021). Rising sea levels pose another significant challenge for Bangladesh's coastal areas (Huq et al., 2015). As the oceans warm and expand, they encroach upon the land, resulting in the gradual inundation of coastal regions (Dasgupta et al., 2019). This process, known as sea-level rise, has dire consequences for the affected communities. It leads to the salinization of freshwater sources, rendering them unsuitable for drinking, irrigation, and livestock rearing (Hossain et al., 2018). The loss of fertile agricultural lands exacerbates food insecurity and poses a threat to the livelihoods of coastal farmers (Sarker et al., 2020).

Moreover, the adverse effects of climate change are not evenly distributed across the population. Marginalized communities, including climate refugees and ethnic minorities, are disproportionately affected by these challenges (Rahman et al., 2017). Climate refugees are individuals and families who have been displaced from their homes due to the impacts of climate change, seeking refuge in other areas (Mortreux & Barnett, 2009). Ethnic minorities residing in the coastal regions have unique livelihood patterns that are deeply intertwined with the natural resources and ecosystems of their surroundings (Jahan et al., 2021). The intensification of climate-related hazards directly threatens their livelihoods and cultural identities (Hussain et al., 2018).

In response to the urgent challenges faced by vulnerable populations in northern, western, and eastern Bangladesh, PHALS (Programme for Helpless and Lagged Societies), a local Non-Governmental Organization (NGO), implemented a project entitled "Resilience Strengthening of Vulnerable Populations in Northern, Western, and Eastern Bangladesh through a Network Approach of 5 Partner Organizations." Supported by Malteser International (MI) from Germany, this project aimed to enhance the adaptive capacity and resilience of communities in the Khuruskul and Chowfaldandi unions, situated in the Sadar Upazila of Cox's Bazar district, Bangladesh.

The primary objective of this study was to investigate the impacts of climate change on the livelihoods of coastal-based communities, with a specific focus on climate refugees and ethnic minorities in the Khuruskul and Chowfaldandi areas of Cox's Bazar. Employing a mixed-methods approach, the study sought to collect high-quality data to identify various issues related to climate change and livelihood adaptation, including the types and effects of disasters, vulnerability assessments, sequences of climate changes and their probability of impact, adaptation strategies of the local vulnerable community, and the potential for creating sustainable livelihood opportunities in the coastal area.

The study encompassed an in-depth exploration of climate change and its implications for the targeted communities, particularly women, people with disabilities, transgender individuals, the elderly, and the youth. A mixed-methods approach was employed, combining quantitative surveys and qualitative data collection methods to obtain comprehensive and nuanced insights. The study involved consultations with individuals, households, diverse actors, and partner agencies operating in the project area.

This study holds significant importance as it provides crucial insights into the climate change-related challenges faced by coastal communities, specifically climate refugees and ethnic minorities. The findings inform PHALS and its partner organizations in designing context-specific interventions and policies to enhance the adaptive capacity and resilience of vulnerable populations in Cox's Bazar. Additionally, the study contributes to the broader knowledge base on climate change adaptation strategies in coastal regions, facilitating evidence-based decision-making at the local, national, and international levels.

Field data collection for this study was conducted between February and March 2023. The selected study area, comprising the vulnerable communities in Khuruskul and Chowfaldandi, provided valuable insights into the challenges faced by climate refugees and ethnic minorities. Quantitative data was collected from a sample population of both men and women, representing the vulnerable individuals within the project area. Additionally, qualitative data was obtained through consultations with various stakeholders, including government representatives, local leaders, producers, traders, and authorities from local markets and business sectors relevant to the project's scope and exposure.

The timely completion of the data collection process ensured that this report presents the most up-to-date findings regarding climate change and livelihood adaptation in the target study area. The subsequent sections of this report will provide a detailed analysis of the literature review, research methodology, key findings, and recommendations derived from the conducted study. These findings aim to contribute to a better understanding of the climate change challenges faced by vulnerable coastal communities in Cox's Bazar, Bangladesh.

1.2 Objectives of the Study

The broad objective of this study is to examine the impacts of climate change on the livelihoods of coastal-based communities, with a specific focus on climate refugees and ethnic minorities in the Khuruskul and Chowfaldandi areas of Cox's Bazar, Bangladesh. The study aims to understand the vulnerabilities and adaptation strategies employed by these communities in response to climate change-induced challenges.

The specific objectives of the study are as follows:

1. To assess the types and effects of climate-related disasters experienced by coastal communities in the study area, including cyclones, storm surges, and extreme weather events.

2. To evaluate the vulnerability of climate refugees and ethnic minorities in the face of climate change impacts, considering factors such as housing conditions, access to resources, and socio-economic status.

3. To identify the sequences of climate changes and their probability of impact on the livelihoods of vulnerable communities, particularly in relation to agriculture, fisheries, and other key sectors.

4. To explore the adaptation livelihood strategies employed by the local vulnerable community, including diversification of income sources, alternative livelihood options, and capacity-building initiatives.

By addressing these specific objectives, the study aims to contribute to a deeper understanding of the climate change and livelihood adaptation dynamics in the target study area, thereby providing valuable insights for policy and practice aimed at enhancing the resilience and well-being of coastal communities in Cox's Bazar, Bangladesh.

1.3 Structure of the Report

This report is organized into several sections, each addressing a specific aspect of the study. Section 2 provides a brief review of the existing literature on climate change impacts, livelihood adaptation, and vulnerability in coastal areas. Section 3 outlines the research methodology, including the data collection techniques and analysis procedures employed. Section 4 presents the findings of the study, highlighting the key issues and emerging themes identified. Section 5 offers a discussion of the findings in relation to existing literature and presents recommendations for policy and practice. Finally, Section 6 concludes the report, summarizing the key findings and emphasizing the importance of climate change adaptation for coastal communities.

2. A BRIEF LITERATURE REVIEW

2.1 Climate Change Impacts in Coastal Areas of Bangladesh

Coastal areas of Bangladesh have long been recognized as highly vulnerable to the impacts of climate change due to their unique geographical features, high population density, and limited adaptive capacity (Haque et al., 2019; Rahman et al., 2020). Bangladesh, located at the deltaic region of major rivers and the Bay of Bengal, faces multiple climate-related challenges, including sea-level rise, cyclones, storm surges, and salinity intrusion (Huq et al., 2019; Kabir et al., 2021). This literature review aims to provide an overview of the existing research on the impacts of climate change in coastal areas of Bangladesh, focusing on the consequences for the natural environment, human livelihoods, and socio-economic aspects.

Impacts on Natural Environment

Sea-level rise is one of the most prominent consequences of climate change in coastal areas of Bangladesh. Studies have shown that the rate of sea-level rise in the Bay of Bengal is higher than the global average, posing a significant threat to coastal communities and ecosystems (Hossain et al., 2018; Karim et al., 2020). The rising sea levels contribute to increased coastal erosion, saltwater intrusion into freshwater sources, and submergence of low-lying areas (Akter et al., 2019; Rahman et al., 2021). These changes in the natural environment have severe implications for agriculture, biodiversity, and water resources management (Islam et al., 2018; Nahar et al., 2020).

The frequency and intensity of cyclones and storm surges have also increased in coastal Bangladesh due to climate change (Dasgupta et al., 2019; Sarker et al., 2022). These extreme weather events result in devastating impacts on infrastructure, housing, and agriculture, leading to loss of lives and livelihoods (Kundu et al., 2020; Uddin et al., 2021). Furthermore, the combined effects of sea-level rise, storm surges, and salinity intrusion have led to the degradation of coastal ecosystems, including mangroves and coral reefs, which serve as natural buffers against coastal hazards
(Alam et al., 2019; Kabir et al., 2022).

Impacts on Income Opportunities

The impacts of climate change in coastal areas of Bangladesh have significant implications for human livelihoods, particularly for the marginalized and vulnerable communities dependent on agriculture, fisheries, and other natural resources (Kabir et al., 2018; Rahman et al., 2019). Studies have highlighted the adverse effects of salinity intrusion on agricultural productivity, leading to crop losses and reduced agricultural incomes (Rahman et al., 2020; Karim et al., 2022). The fishing communities, already vulnerable due to overfishing and resource depletion, face additional challenges from sea-level rise and changes in fish migration patterns (Islam et al., 2019; Saha et al., 2021).

Migration has emerged as a coping strategy for many coastal communities affected by climate change impacts (Haque et al., 2020; Rahman et al., 2022). Climate-induced displacement and internal migration have led to social and economic disruptions, particularly for those who are forced to leave their homes and livelihoods

behind (Rahman et al., 2021; Uddin et al., 2023). Women, in particular, face unique challenges as they often bear the brunt of climate-induced vulnerabilities and are subjected to increased gender inequalities (Haque et al., 2021; Kabir et al., 2023).

Socio-economic Implications

The socio-economic implications of climate change in coastal areas of Bangladesh are far-reaching. Studies have highlighted the disproportionate impacts on poverty, food security, and health in these vulnerable communities (Hossain et al., 2021; Kundu et al., 2023). The loss of productive assets, reduced income opportunities, and increased food insecurity further exacerbate poverty levels (Akter et al., 2020; Rahman et al., 2022). The strain on public health systems due to climate-related diseases and the displacement of communities have significant implications for the overall well-being and resilience of coastal populations (Sarker et al., 2021; Uddin et al., 2022).

The reviewed literature highlights the profound impacts of climate change in coastal areas of Bangladesh, encompassing the natural environment, human livelihoods, and socio-economic aspects. The vulnerabilities faced by coastal communities necessitate urgent and targeted interventions to enhance their adaptive capacity, protect their livelihoods, and ensure sustainable development. This comprehensive understanding of the impacts of climate change can inform policymakers, practitioners, and researchers in formulating effective strategies and policies for climate change adaptation and resilience-building in coastal Bangladesh.

2.2 Livelihood Options and Adaptation Scenario in Coastal Areas of Bangladesh

Livelihood Options in Coastal Areas

Several studies have highlighted the diverse livelihood options available to the coastal communities of Bangladesh. Akter, Gnauck, and Ahmed (2019) emphasize the importance of understanding the dynamics of coastal land use and its connection to livelihoods. Haque, Iqbal, Rahman, and Adnan (2019) conducted a study on three coastal communities and identified various livelihood options such as agriculture, fishing, and small-scale businesses.

Impacts on Agriculture and Food Security

The impacts of climate change on agricultural productivity and food security in coastal areas have been extensively studied. Akter, Turton, and Sithole (2020) examine the effects of climate change on agriculture and highlight the need for adaptive strategies such as the promotion of climate-resilient crops and improved water management. Huq, Dasgupta, Hassan, Khan, and Islam (2019) focus on the impacts of salinity intrusion on agriculture, emphasizing the need for salt-tolerant crop varieties and improved irrigation techniques.

Challenges for Fishing Communities

The fishing communities in coastal areas face numerous challenges due to climate change. Islam, Uddin, and Kabir (2019) study the impacts on the livelihoods of fisherfolk and underscore the importance of sustainable fisheries management practices. Haque, Khan, and Rahman (2021) explore the gendered vulnerabilities and coping strategies of coastal communities, highlighting the need for gender-responsive adaptation measures and the empowerment of women.

Adaptation Scenarios and Strategies

Adaptation scenarios and strategies have been examined in the context of coastal areas. Hossain, Kundu, Uddin, and Nessa (2021) review climate change vulnerability assessments and stress the significance of integrated adaptation approaches, including ecosystem-based strategies, infrastructure development, and community participation. Kabir, Hoque, and Uddin (2018) provide a comprehensive review of climate change impacts and adaptation strategies in coastal zones, emphasizing the need for coastal protection measures, disaster risk reduction, and the promotion of sustainable livelihood practices.

This literature highlights the diverse livelihood options available to the coastal communities of Bangladesh and the need for adaptation strategies to address the challenges posed by climate change. The studies emphasize the importance of diversifying livelihoods, promoting sustainable land and water management practices, adopting climate-resilient agricultural techniques, and implementing gender-responsive and community-based adaptation measures. These findings provide valuable insights for policymakers, development practitioners, and local communities in formulating effective strategies to enhance the resilience and sustainability of livelihoods in coastal areas of Bangladesh.

2.3 Vulnerability of Coastal Communities to Disasters

Coastal areas of Bangladesh are prone to various hazards, including cyclones, storm surges, and sea-level rise. These hazards pose significant risks and vulnerabilities to the coastal population, particularly the fishing community. This literature review aims to provide a comprehensive understanding of the coastal risk and vulnerability faced by the fishing community in Bangladesh and explore the adaptation strategies and resilience-building initiatives in place.

Coastal Hazards and Vulnerability

a. **Cyclones and Storm Surges:** Cyclones are one of the most destructive hazards faced by coastal areas of Bangladesh. The frequency and intensity of cyclones have increased in recent years due to climate change. These events result in significant damage to infrastructure, loss of lives, and disruptions to livelihoods (Ahmed, Chowdhury, & Rahman, 2019). Storm surges, often associated with cyclones, exacerbate the impacts, causing widespread flooding and coastal erosion (Hossain, Rahman, & Zaman, 2021). The vulnerable coastal population, including the fishing community, faces substantial risks from these hazards.

b. **Sea-Level Rise and Coastal Erosion:** Sea-level rise is a long-term threat to coastal areas, leading to erosion, salinity intrusion, and loss of habitable land. The fishing community, which relies heavily on coastal resources, is directly affected by the loss of fishing grounds and shrinking coastal areas for settlement (Islam, Datta, & Rahman, 2018). The increased vulnerability of coastal populations necessitates adaptive measures to ensure their resilience and sustainable livelihoods.

Impacts on the Fishing Community

a. **Livelihood Disruption and Losses:** Cyclones and other coastal hazards have severe implications for the fishing community in Bangladesh. These events disrupt fishing activities, damage fishing equipment and infrastructure, and result in the loss of fishing vessels and livelihood assets (Ahmed et al., 2019). The fishing community experiences significant economic losses and struggles to recover from these setbacks.

b. **Socio-economic Challenges**: The fishing community faces socio-economic challenges, including limited access to financial resources, inadequate market infrastructure, and lack of alternative livelihood options. The reliance on traditional fishing practices further exacerbates their vulnerability to climate-related risks (Sultana & Huq, 2020). These challenges highlight the need for adaptation strategies tailored to the specific needs and circumstances of the fishing community.

Adaptation Strategies and Resilience Building

a. **Community-Based Early Warning Systems:** Efforts have been made to enhance early warning systems to mitigate the impacts of coastal hazards on the fishing community. Community-based early warning systems, such as the Cyclone Preparedness Program (CPP), have been implemented to disseminate timely and accurate information to vulnerable communities, enabling them to take appropriate preparedness measures (Ahmed, Rahman, & Hossain, 2020). Such initiatives play a crucial role in reducing the loss of lives and assets during cyclonic events.

b. **Livelihood Diversification and Alternative Options** Diversifying livelihood options is essential for building the resilience of the fishing community. This includes promoting alternative income-generating activities such as aquaculture, agriculture, and non-farm enterprises (Hossain et al., 2021). The provision of training, access to credit, and market linkages are vital in enabling the fishing community to explore alternative avenues and reduce their dependence on fishing alone.

c. **Social Protection and Sustainable Resource Management:** Social protection programs play a vital role in reducing vulnerability and ensuring the well-being of the fishing community. Targeted interventions, such as cash grants, insurance schemes, and safety nets, provide support during periods of livelihood disruption (Sultana & Huq, 2020). Additionally, sustainable resource management practices, including fisheries conservation and restoration measures, are crucial for preserving fish stocks and ensuring the long-term viability of the fishing industry.

The coastal population of Bangladesh, particularly the fishing community, faces significant risks and vulnerabilities due to coastal hazards. The impacts include livelihood disruption, economic losses, and socio-economic challenges. However, various adaptation strategies and resilience-building initiatives have been implemented to mitigate these risks and enhance the resilience of the fishing community. Community-based early warning systems, livelihood diversification, social protection programs, and sustainable resource management are critical components of these efforts. Continued research, policy support, and stakeholder collaboration are essential to address the unique challenges faced by the fishing community and promote their sustainable development in the face of coastal risks and vulnerabilities.

In Conclusion, this literature review provides valuable insights into the coastal risk and vulnerability faced by the fishing community in Bangladesh. Coastal areas in Bangladesh are highly susceptible to hazards such as cyclones, storm surges, sea-level rise, and coastal erosion. These hazards have severe implications for the fishing community, including livelihood disruption, economic losses, and socio-economic challenges.

The review highlights the need for effective adaptation strategies and resilience-building initiatives tailored to the specific needs and circumstances of the

fishing community. Community-based early warning systems, such as the Cyclone Preparedness Program (CPP), play a crucial role in reducing the loss of lives and assets during cyclonic events. Livelihood diversification and the promotion of alternative income-generating activities are essential for building the resilience of the fishing community. Access to training, credit, and market linkages enable them to explore alternative avenues and reduce their dependence on fishing alone.
Social protection programs, including cash grants, insurance schemes, and safety nets, are vital in providing support during periods of livelihood disruption. Sustainable resource management practices, including fisheries conservation and restoration, are crucial for preserving fish stocks and ensuring the long-term viability of the fishing industry.

Overall, this literature review emphasizes the importance of continued research, policy support, and stakeholder collaboration to address the unique challenges faced by the fishing community and promote their sustainable development in the face of coastal risks and vulnerabilities. By implementing effective adaptation strategies and resilience-building initiatives, we can enhance the capacity of the fishing community to cope with coastal hazards and achieve long-term sustainability in coastal areas of Bangladesh.

3. METHODOLOGY AND APPROACH

3.1 Study area

Khuruskul and Chowfaldandi union, Cox's Bazar Sadar, Cox's Bazar district, Chattogram division, Bangladesh.

3.2 Primary Approach

The study followed a mixed methods approach that included both qualitative and quantitative methods. Both type of data's methodological approach (especially the quantitative data) specifically consulted and identified opportunities for women, people with disability, transgender, aged, and youth (male and female). The approach included reviews of secondary information, peer reviewed research journal articles, relevant research and organizational reports, and assessments. The qualitative data was acquired through Focus Group Discussions (FGD) through P-FIM (People First Impact Method) with vulnerable men and women inclusively. The qualitative data also included Key Informants Interviews (KII) with the responsible government and non-government officials. Primary information was collected following international best practices and protocols.

3.3 Data Collection Technique and Sampling

A. Quantitative Data:

A total of 210 respondents from the selected communities (i.e., communities from Asrayon Prokalpa area of Khuruskul union and Chowfaldandidi coastal area inhabitants) were interviewed following purposive sampling technique. The detailed breakdown of the respondents from different demographic backgrounds has been described at the inception of section 3.

Data Collection Tool

For an efficient data collection and getting error-free database, a closed-ended questionnaire was prepared the responses were coded manually.

B. Qualitative Data Collection:

The qualitative data collection comprised of six (06) FGDs and Seven (07) KIIs in total (please see the table below for detailed breakdown of the respondents). Among the six FGDs conducted three were conducted recognized climate refugees (one mixed, one only man and one only female). Another two FGDs were conducted with Rakhine community (one only men and one only women FGD). Additionally, one mixed group FGD was conducted with the Muslim community from the Chawfaldandi union.

Table 1: Summary of proposed sampling distribution*

Quantitative Approach	
HH Interviews: 210	
Qualitative Approach	
FGDs: 06 1. Climate Refugee -3 2. Rakhine Community -2 3. Muslim Community (Chawfaldandi) - 1	**KIIs: 08** 1. Upazilla Nirbahi Officer (UNO), Cox's Bazaar Sadar Upazilla 2. Project Implementation Officer 3. Agriculture Officer 4. Senior Upazilla Fisheries Officer 5. Chairman (Acting), Chawfaldandi Union 6. Chairman, Khurushkhul Union 7. Executive Director, PHALS 8. NGO (Concern Worldwide) Official

3.4 Data Analysis

For quantitative data analysis, SPSS software was used. To ensure quality, each interview was double-checked by the selected members of research team. The categorization was done according to themes and sub-themes followed by a compilation of information. The investigators (primary researcher) used an iterative approach to conduct the analysis.

3.5 Data Storage

Strict confidentiality was ensured while data was stored following the authorized study procedure. In addition to the data collecting activity, all of the researchers engaged were given extensive training on data confidentiality during the collection and preservation of data. Digital data was encrypted, and all paper files were maintained in a safe and secured place chosen by the investigators.

3.6 Ethical Considerations

The study was ensured the ethical issues that were involved, including the risks and benefits of the respondents. The study tools development and analysis process followed the Ethical Guidelines 2003 by Social Research Association (Social Research Association, 2003). Before conducting data collection, each respondent was informed about the purposes, type of information coverage, and confidentiality. The respondents participated in the study voluntarily and they had the opportunity to terminate participation at any stage of the study.

4. QUANTITATIVE FINDINGS OF THE STUDY

4.1 Study Population

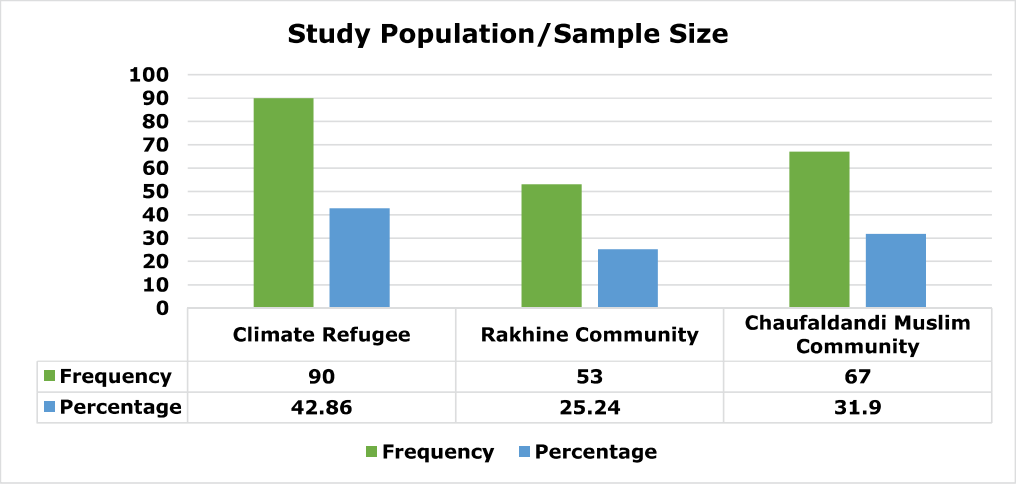

Figure 1: Frequency and percentage distribution of the study population.

A total of 210 data were collected from three distinct communities in the study area, with nearly half (42.86%) of the dataset containing information on Climate Refugees from the Khurushkul Asrayan Prokolpo. Chawfaldandi Muslim Community consisted 31.90% population of this study while the remainder 25.24 contains ethnic community of Rakhines. (See figure 1)

4.2 Socio-Demographic Characteristics

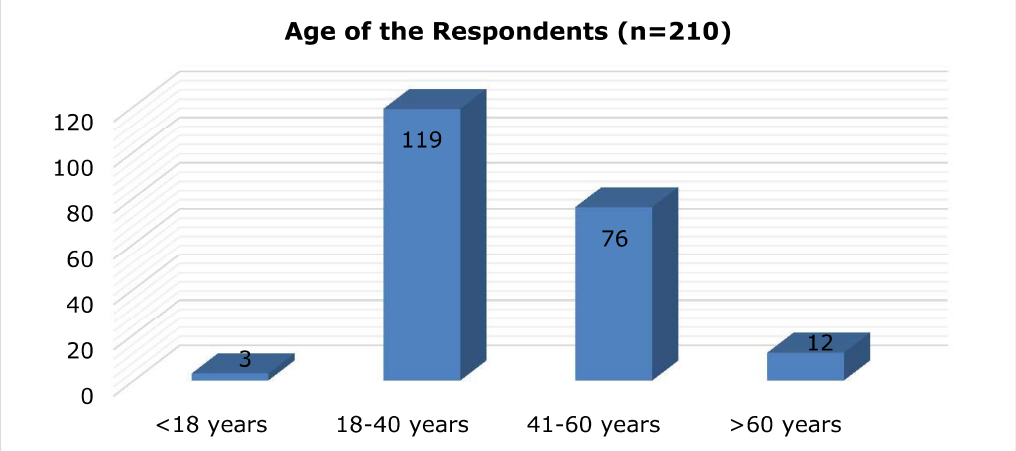

Figure 2: Frequency distribution of respondents' age group

More than half of the respondent (n=119) are adults within the age group of 18 years to 40 years old. As per participant's age distribution table, the next highest number of the respondents (n=76) falls under the age group of 41 years to 60 years old.

This graph depicts that adult constitutes the majority of the study. Old participants over the age of 60 years were 12 in number. Only 3 participants were under the age of 18 years old.

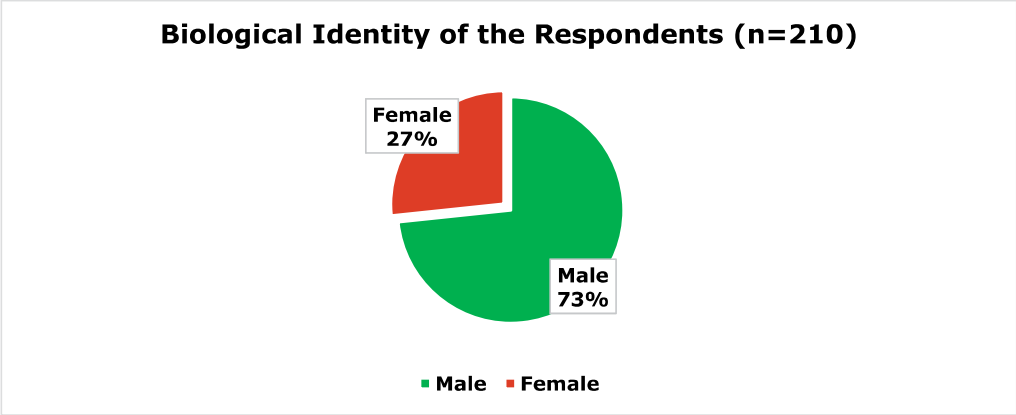

Figure 2: Frequency distribution of respondents' age group

Gender is considered an essential demographic variable for quantitative research. The gender distribution in this study is inclined towards male, with a gigantic number of 154 male respondents and only 56 female respondents. So, among the study population of 210 individuals, males will evidently outnumber females. (See figure 3)

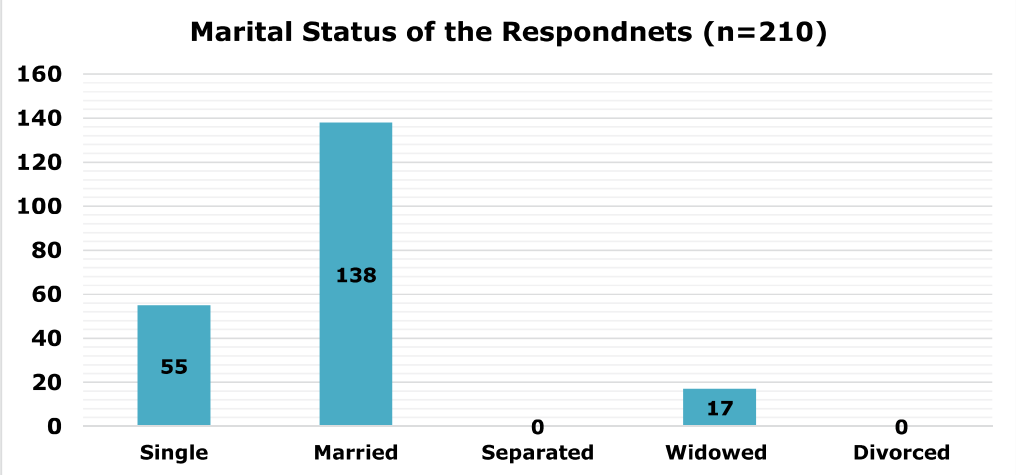

Figure 4: Frequency distribution of respondents' marital status.

It can be evidently seen that among the 210 respondents, a huge number of 138 were married which mostly belonged to the 18 to 60 years old age group. Single or unmarried respondents were 55 in number. Moreover, a meagre number of 17 respondents were widowed where majority belonged to the old group of 60 or more years old. Surprisingly, there was no cases/no respondent to have reported to be divorced/separated.

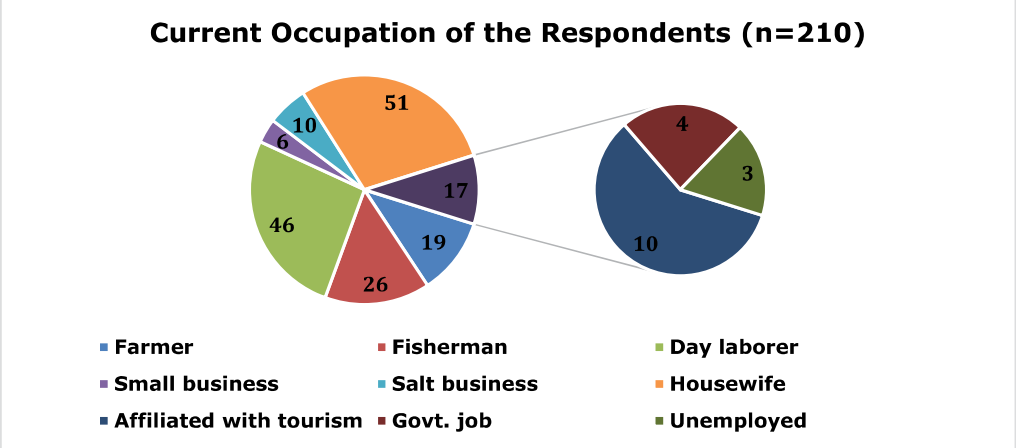

Figure 5: Frequency distribution of respondents' current occupation

It is apparent that close to one-fourth of the study population (n=51) are housewives, among whom almost all of them are engaged in livestock gardening, some in tailoring. Since this indoor activity is also a part of a housewife's daily chores, they are regarded as housewives even after contributing to the economy indirectly. Among others, a good number of 46 respondents were day laborers involved in activities such as electrician, mason, Nappi, rickshaw-puller. Fishermen and farmer respondents were 26 and 19 in number from all 3 communities. Equal number of respondents (n=10) were employed in tourist-business (hotel boys, cook, cleaners) and salt business. A negligible number of respondents were involved in small business (shop-owners, shop keepers) or govt job or not involved in any jobs at all.

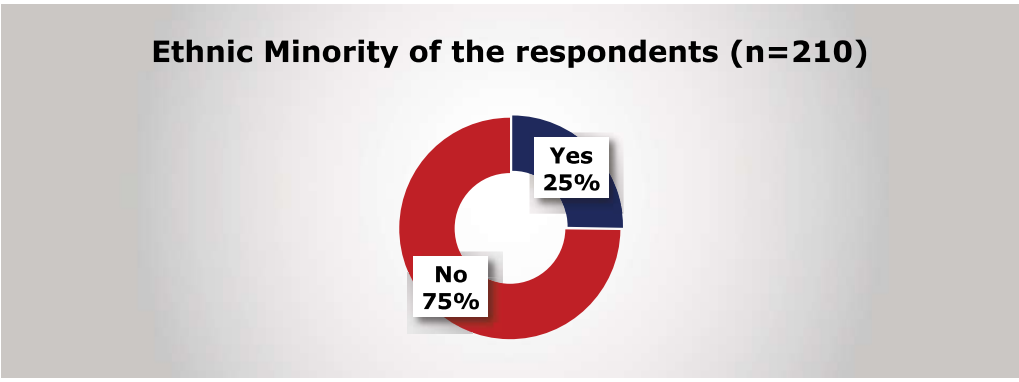

Figure 6: Percentage distribution of respondents' ethnic identity

When asked about the ethnic identity, majority (73.5 %) of the population replied in the negative, confirming their nationality as Bangladeshi wherein 26.5 percent identified themselves to be Rakhine, one of the ethnic groups of Bangladesh settling in coastal areas of Cox's Bazar. (See Table 5).

4.3 Socio-Economic Condition:

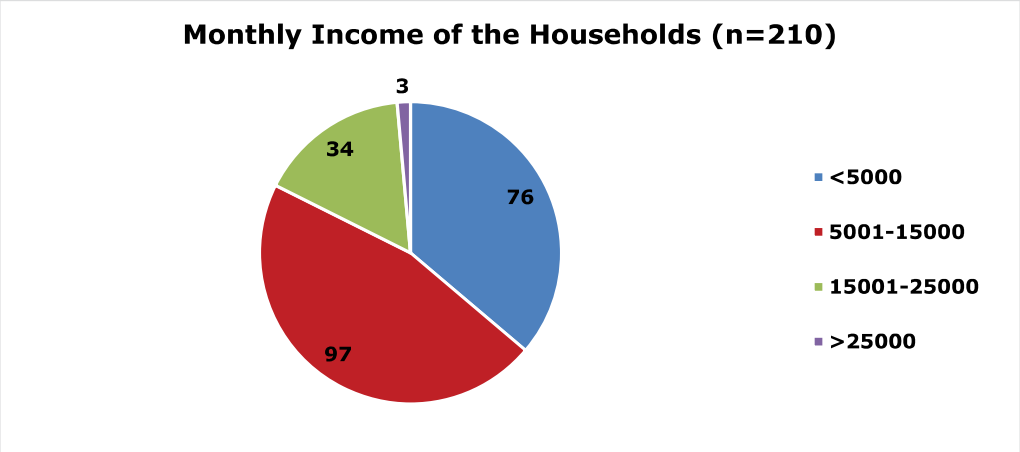

Figure 7: Frequency distribution of respondents' monthly income

Among the total study population, close to half of the respondents (n=97) belong to the monthly income group of 5001-15000 takas also known as moderately poor. The second highest number of respondent (n=76) falls under the poorest income group (<5000) takas. Individuals with middle-level income ranging from 15001-25000 takas were 34 in number. Moderately rich individuals were the least in number (n=3) in the study with an income of more than 25000 takas.

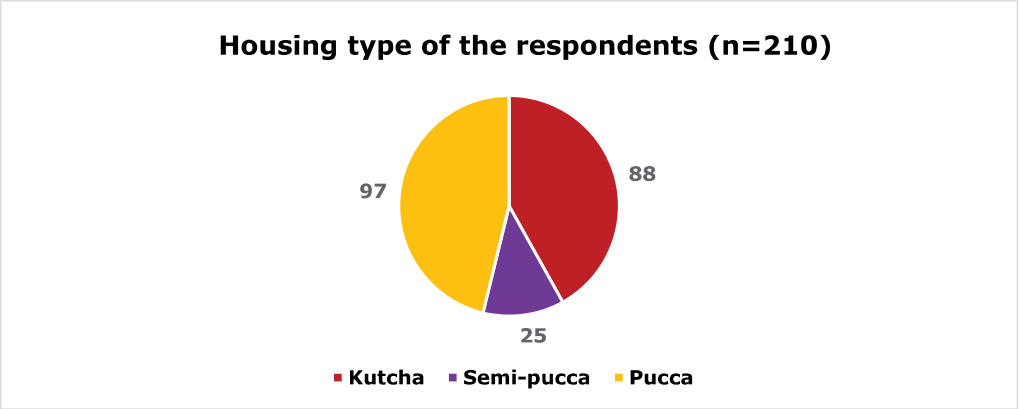

Figure 8: Frequency distribution of respondents' housing condition

Speaking about the housing condition, 97 respondents said to have lived in pucca house among whom majority belonged to the refugee community as government has made 5 or more floored building for them. Almost equal yet lower number of respondents (n=88) referred their housing condition as kutcha, houses that are made with mud and straw. Only 25 responses, containing one-eighth of the respondents mentioned semi-pucca house.

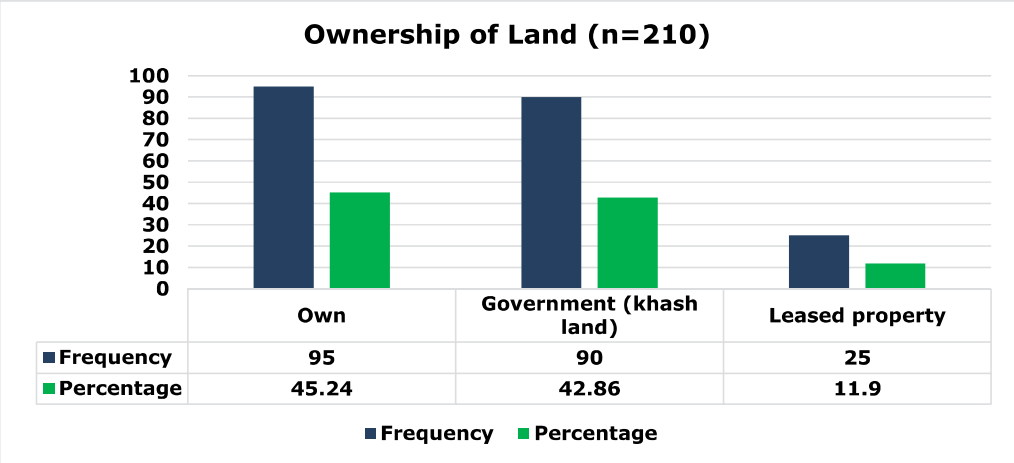

Figure 9: Frequency and percentage distribution of respondents' ownership of lands

The following graph shows that almost half of the respondents (45.24 %) lived on their own land. In the study, such respondents were 95 in number. Among the others, 90 respondents (42.86 %) accommodated themselves in government-owned khas land. The land of refugee community used to be khas land before the Asrayan project was undertaken. The rest 11.9 percent response belonged to the 25 respondents who lived on leased property.

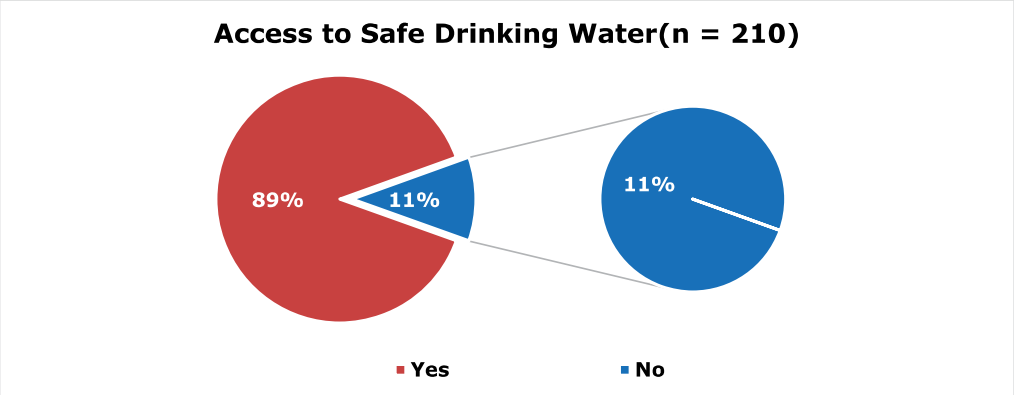

Figure 10: Percentage distribution of respondents' access to safe drinking water

Responses from respondents were divided into two when they were asked about safety of their source of drinking water. A large portion (89%) from the respondents held the same responses of 187 individuals who replied in the positive, saying that their source of drinking water was safe. Only 11 percent from the respondents, who were 23 in number, expressed about their inaccessibility to safe drinking water sources.

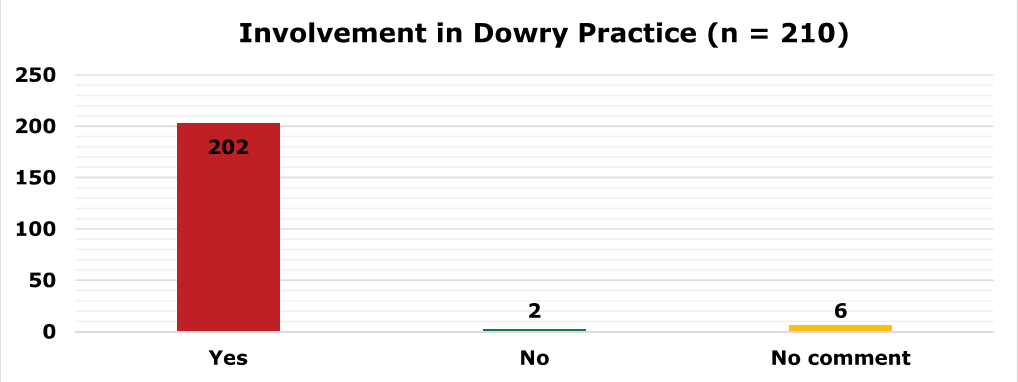

Figure 11: Frequency distribution of respondents' involvement in dowry practice

The responses were surprising when the respondents were queried about their involvement in giving and taking dowries while marrying. Almost everyone (with a massive number of 202 responses) confirmed that they gave or received dowry in their lifetime. Only 2 responses showed deviation. The rest 6 respondents chose to share no comments.

4.4 Disaster Related Information

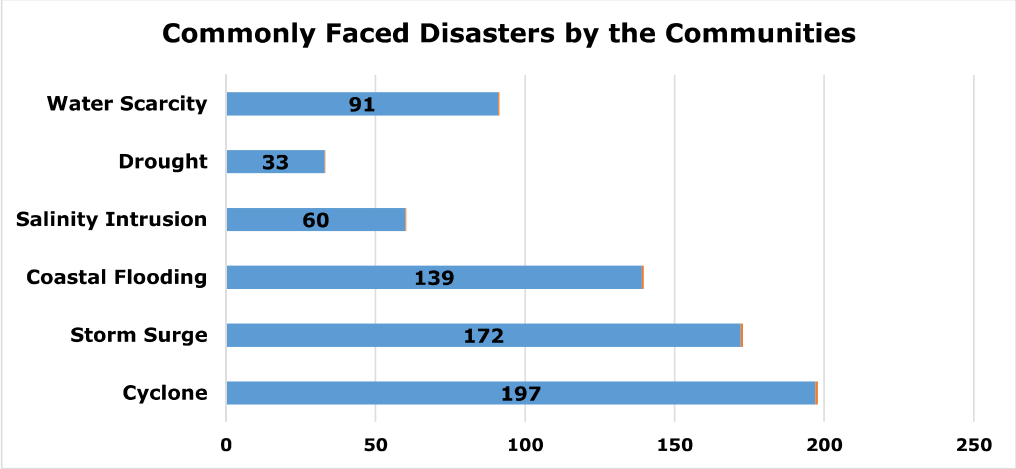

Figure 12: Most common disasters faced by the community people

The replies from 210 people regarding the typical disasters in their area are represented in the graph. Out of the 210 responses, 197 people (93.80%) said that cyclone is the most prevalent disaster in their area. About 81.90 percent claimed to regularly encounter storm surges. A total of 139 people stated that coastal flooding was a frequent disaster in their area. As a result of the responses, cyclones, storm surges, and coastal flooding are the three disasters that happen most frequently in the specified area. Water scarcity, drought, and salinity intrusion are all faced by the community people but less frequently.

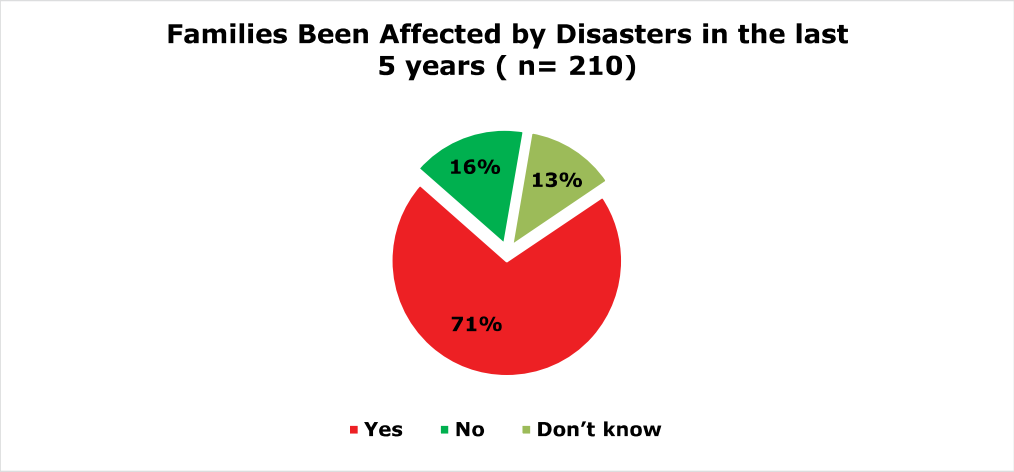

Figure 13: Percentage distribution of disaster-affected families in the last 5 years

The respondent families' experiences with disasters during the previous five years are presented here. Around 71 percent of respondents have confessed that disaster has impacted their families in the previous five years. Thirteen percent said that their families had not been impacted by catastrophes in the previous five years. This suggests that the majority of respondents have personally been affected by any major disasters during that time. Other respondents were unsure about the impact of disaster in their families.

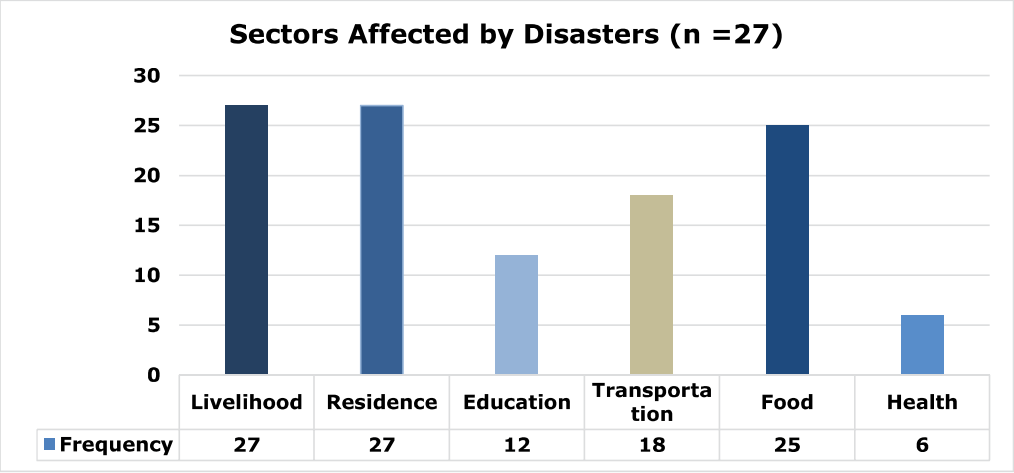

Figure 14: Frequency distribution of the most affected sectors by disasters

In the past five years, 27 of the 210 respondents reported being affected by natural disasters. Based on the responses of 27 people, this graph depicts the spheres of life that were adversely affected by disasters. All of the respondents agreed that their livelihoods and residence were affected by disasters. More than 40 percent of the 27 respondents said that disasters had an impact on education system. Disasters cause school closings, damage to learning facilities, or transportation issues, making it difficult for students to attend class regularly in those areas. About 66 percent said that disasters had an impact on transportation. 25 out of 27 respondents stated that

catastrophes hampered their access to food. Disasters can interfere with agricultural processes, obliterate crops or cattle, and have an impact on the food distribution networks, which can result in food shortages or increased costs. Only 6 respondents stated that disasters harmed their health.

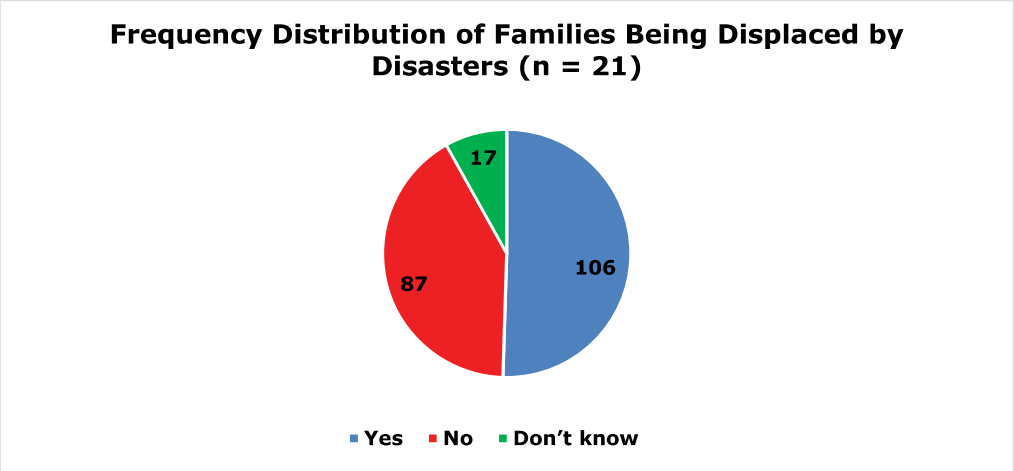

Figure 15: Frequency distribution of families being displaced by disasters

The experiences of respondents who were displaced as a result of calamities are shown in this graph. 50.48 percent of respondents, or 106 people, stated that disasters had forced them or their families to relocate. According to 87 out of 210 respondents said neither they nor their families had to relocate due to disasters. 17 respondents said they were unsure if they or their families had been forced to relocate due to catastrophes.

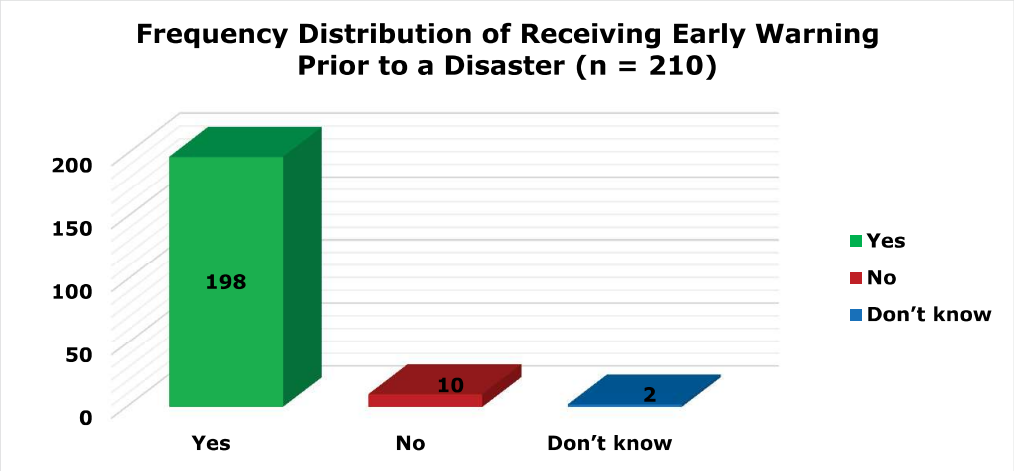

Figure 16: Frequency distribution of receiving an early warning before a disaster

This is a summary of the respondents' experiences with receiving early warnings before a disaster in the last 5 years. 198 respondents reported receiving early warnings and 10 respondents stated that they did not receive early warnings before a disaster in the last 5 years. This indicates that a small percentage of respondents

did not receive timely notifications about impending disasters. Only a few mentioned that they don't know whether they received early warnings before a disaster in the last 5 years.

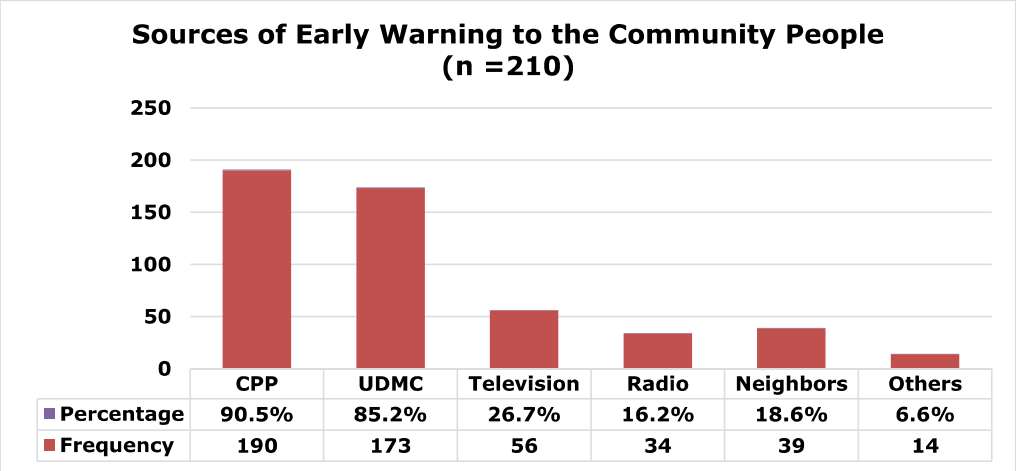

Figure 17: Sources of early warning to the community people as per the respondents

The sources of early warning indicated by the respondents are shown in this bar chart. CPP was identified as a source of early warning by 190 responders (90.5%). 85.2 percent, or 173 respondents, cited UDMC as a source of early warning. An organization or body called the Unified Disaster Management Council is in charge of organizing disaster management initiatives and broadcasting early warnings at the local or regional level. 56 people (26.7%) out of the total respondents indicated television as a source of early warning. For about 34 respondents (16.2%), radio was cited as an early warning source. As a source of early warning, 39 respondents (18.6%) named their neighbors. Community members may rely on the information provided by their neighbors, who may have gotten early warnings from a variety of sources, such as government notifications or personal observations.14 respondents (6.6%) mentioned other early warning systems.

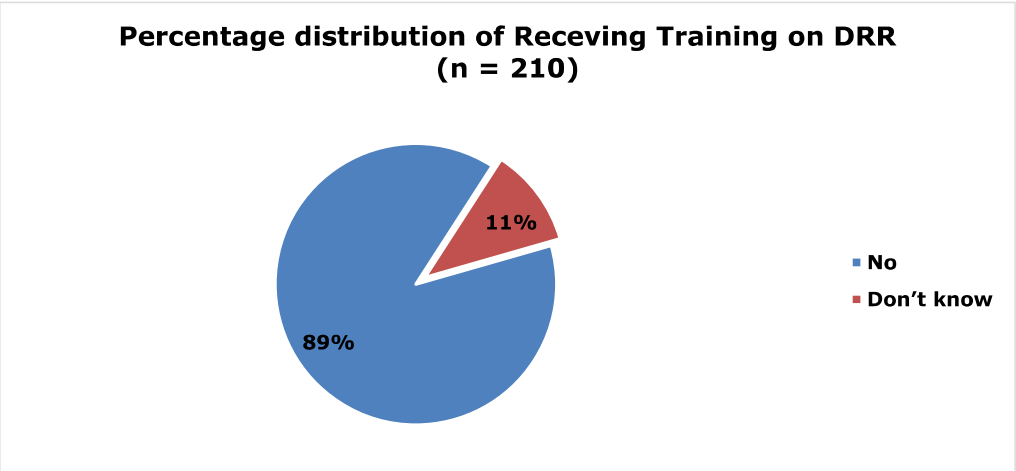

Figure 18: Percentage of respondent's training regarding disaster risk reduction

This graph represents a summary of the respondents' training regarding disaster risk reduction. None of the respondents reported receiving training regarding disaster risk reduction. This indicates that no individuals among the 210 respondents have received specific training in this area. Almost 186 respondents (89%) stated that they have not received any formal training regarding disaster risk reduction whereas 11% mentioned that they do not know whether they have received training regarding disaster risk reduction.

4.5 Climate Change and its Impact

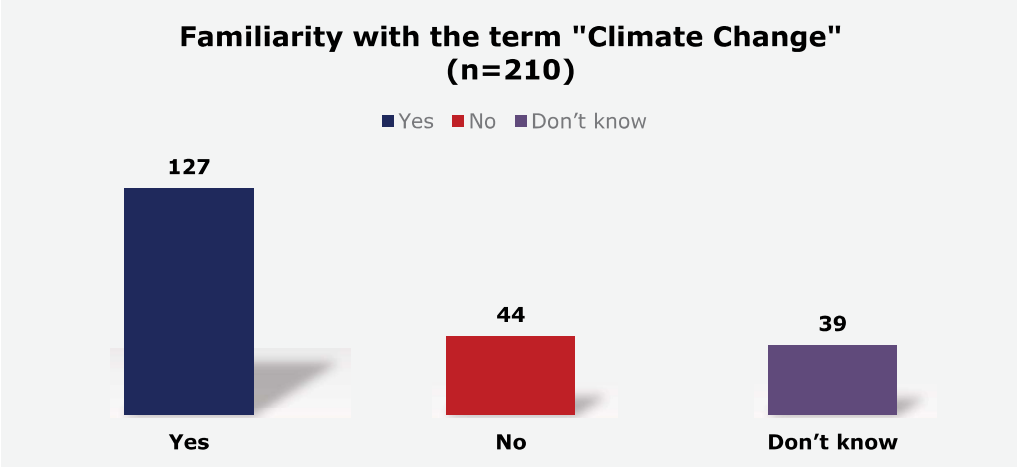

Figure 19: Frequency distribution of respondents' familiarity with climate change

While answering the question of familiarization with the term "climate change", more than half of the respondents (n=127) replied in the affirmative which reflected their understanding (however the level of knowledge may be) of the term "climate change". Very few elderly and illiterate individuals (n=44) replied in the negative which implicates their lack of knowledge over the issue. Another 39 respondents were reluctant enough to not recall/know about the issue.

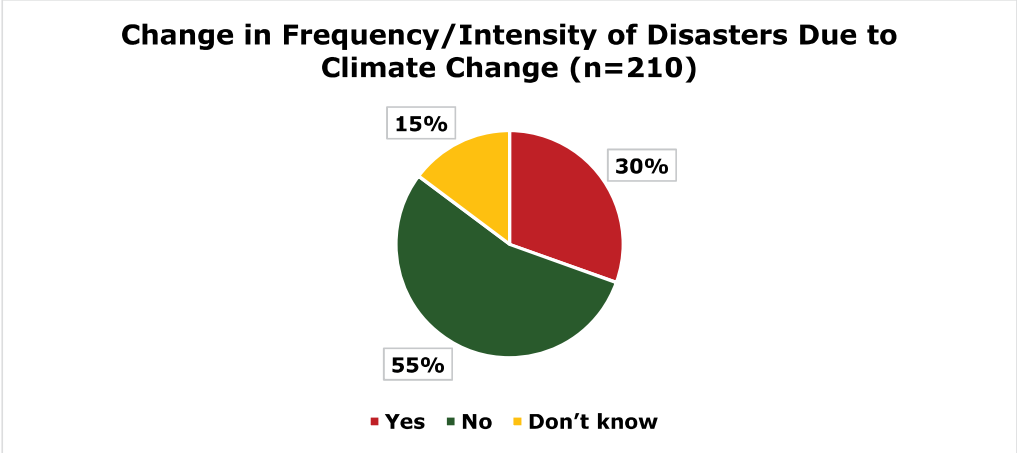

Figure 20: Percentage distribution of respondents' account of the frequency and intensity of disasters due to climate change

Respondents were asked to differentiate between the existing intensity or frequency of disasters with that of the past 5 years. The majority of the respondents (n=115) replied that they didn't come across any change in the disaster pattern, meaning that the severity and frequency of disasters were the same as 5 years before. However, 64 respondents' responses differed from the majority's opinion. They reported to have noticed difference from the disasters of past 5 years. The rest 31 respondents were reluctant enough to not recall/know about the issue.

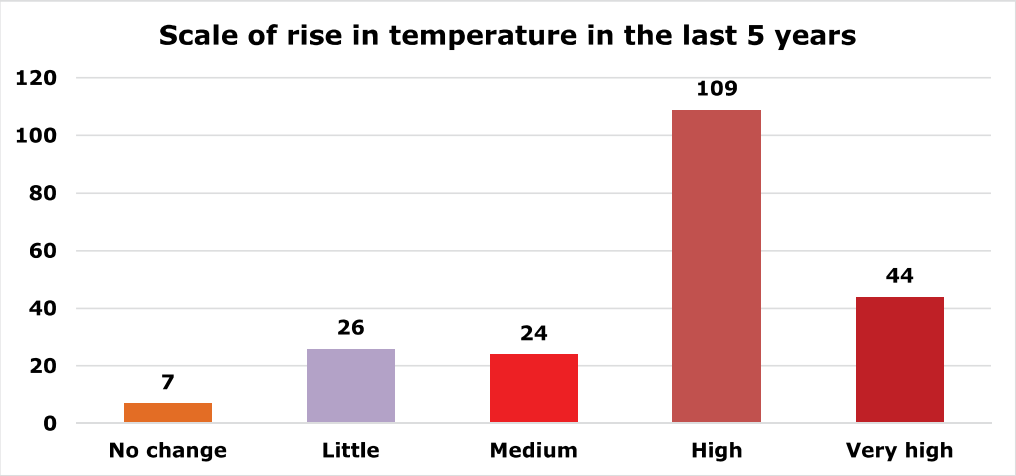

Figure 21: Frequency distribution of respondents' accounts of the scales of rise in temperature in last 5 years

Talking about the weather pattern, half of the respondents (n = 109) reported to have observed high level of increasement in the temperature compared to that of last 5 years wherein One-fifth of the respondents (n = 44) suffered from a very high rise in temperature. Only 24 and 26 respondents provided the information of medium rise and a little rise in temperature. Only a meagre number of respondents (n=7) didn't detect any change in the temperature pattern.

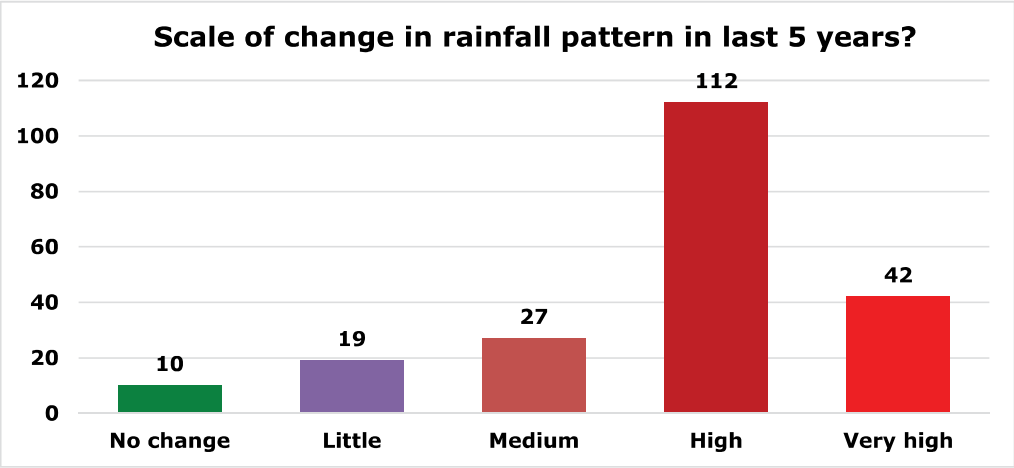

Figure 22: Frequency distribution of the respondents' accounts of scales of change in rainfall pattern in last 5 years observed by the respondents.

More than half of the respondents remarked high change in the rainfall pattern compared to that of the previous years. Similar remarks were provided by 42 other respondents who distinguished very high change in precipitation pattern. Medium and little change was observed by only 27 and 19 respondents. The rest 10 respondents didn't take notice of any shifting of rainfall trajectory.

Same answers have been provided when asked about change in winter intensity or sea level rise spotted by the respondents.

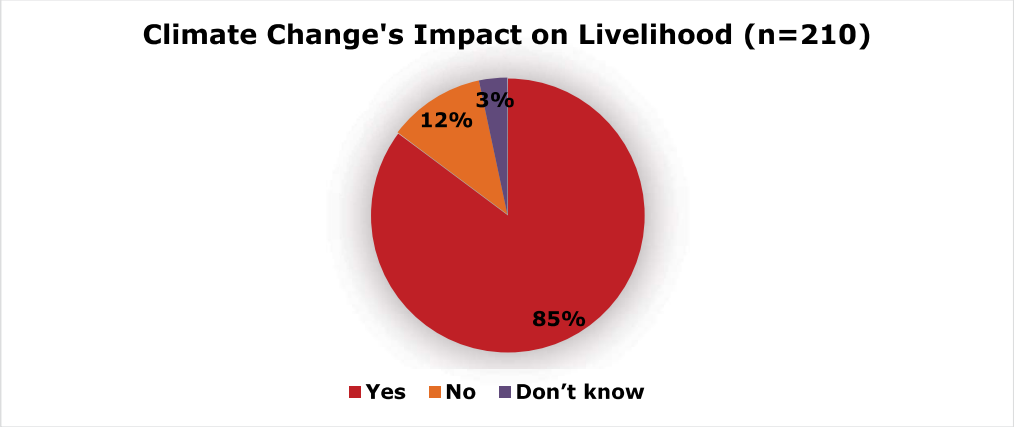

Figure 23: Percentage distribution of climate change impact on respondents' livelihood

Regarding the impact of climate change on livelihood, nearly 85 % of respondents responded positively. Only a few respondents denied any impact of the changing climate on their livelihood, which is 12%. Lastly, a negligible number of respondents (3%) were negligent enough to recall/know anything about it.

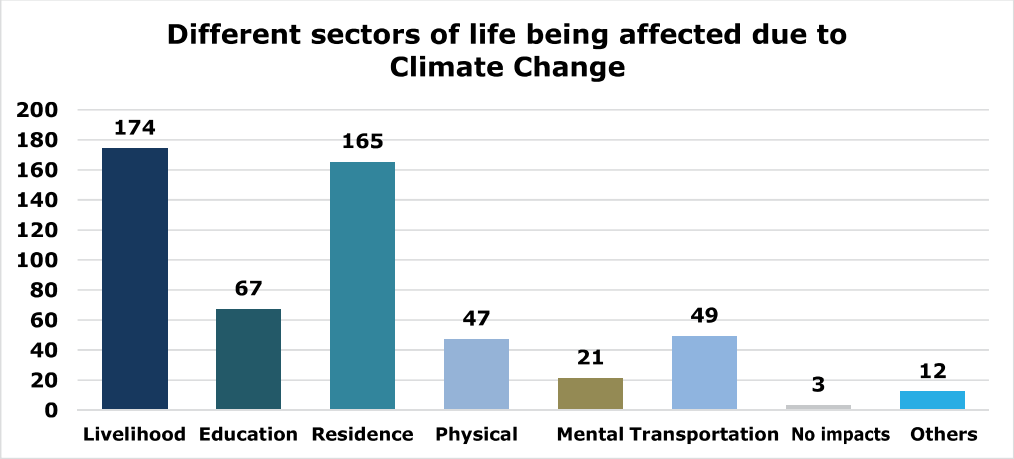

Figure 24: Frequency distribution of climate change impact on respondents' different life sectors

As per the responses from the respondents the most effected sectors are livelihood and residence due to climate change. Respectively, 174 and 165 responses were collected where the respondent's confirmed disturbance in their livelihood and

residence due to climate change. Education and transportation sector were less likely to be impacted by climate change as they were mentioned by fewer times (n=67,49). Health sector was observed to be the least affected sector due to climate change, physical health and mental health were mentioned only 47 and 21 times by the respondents. Only 3 responses were collected where the respondents denied of any impacts.

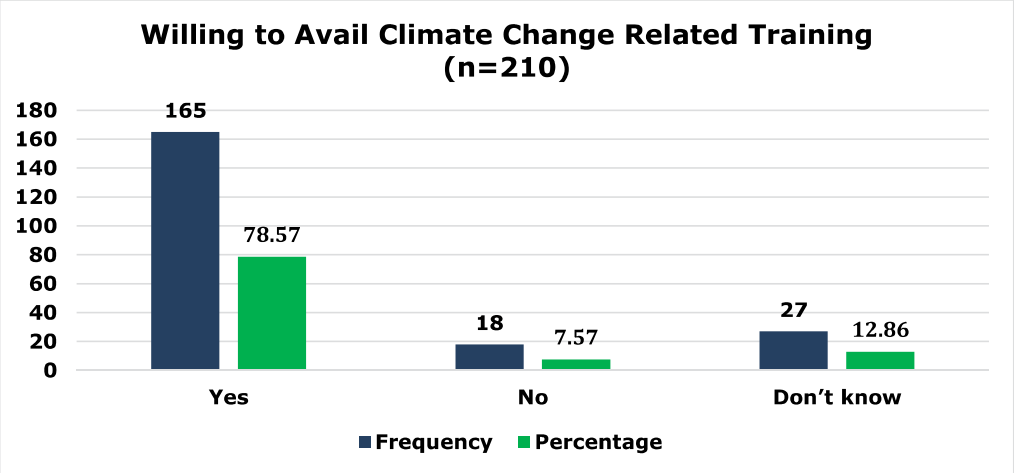

Figure 25: Respondents' willingness to avail climate change related training

After the discussion of the adverse impacts of climate change, respondents were asked if they were eager enough to partake in any climate change related trainings or workshops. Gigantic number of respondents (78.57 %) were enthusiastic to receive any sorts of trainings. Only 7.57 percent (n=18) showed reluctancy in this regard. Remaining 12.86 percent (n=27) respondents were confused still as they didn't know if they wanted any trainings or not.

4.6 Livelihood and Adaptation Measures

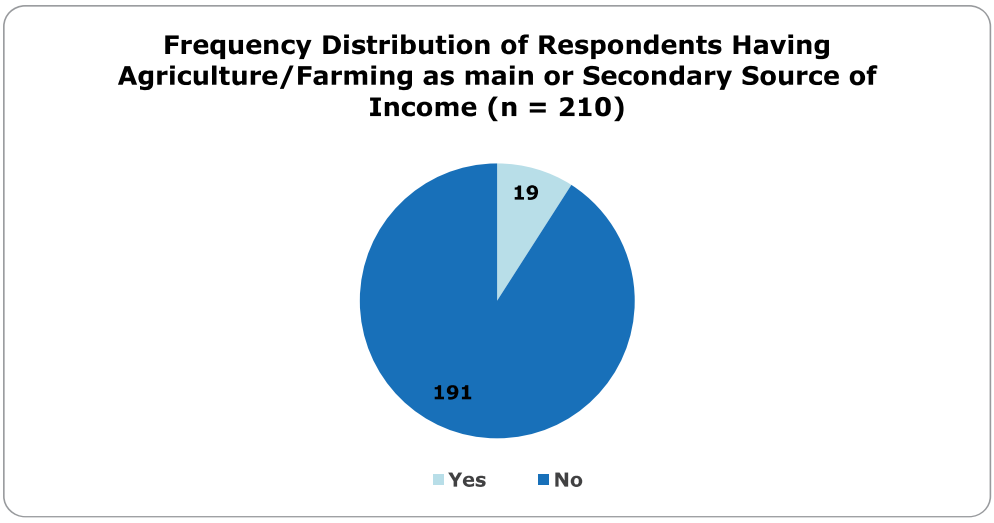

Figure 26: Frequency distribution of persons who depend upon farming as their main or secondary source of income

The graph represents the responses from 210 individuals regarding whether agriculture or farming is their main or secondary source of income. In summary, based on the responses, the vast majority of the 210 individuals surveyed (approximately 90.95%) do not rely on agriculture or farming as their main or secondary source of income. Only a small percentage of respondents (approximately 9.05%) indicated that agriculture or farming is their main or secondary source of income.

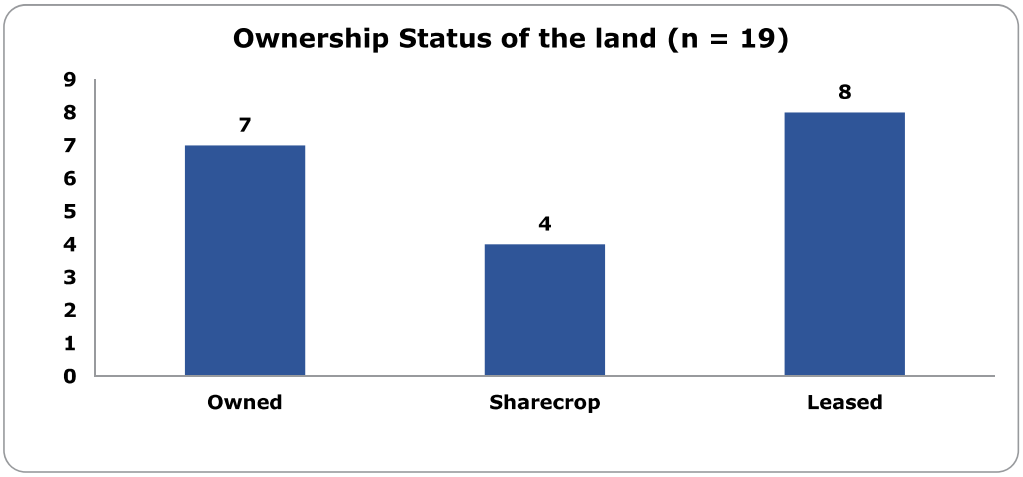

Figure 27: Land ownership status of respondents whose main/secondary income source was agriculture.

This bar chart represents the responses from 19 individuals regarding the ownership status of the land they use for cultivating crops. based on the responses of the 19 individuals surveyed, the ownership status of the land used for cultivating crops is as follows: 36.84 percent own the land, 21.05 percent are involved in sharecropping (cultivating crops on land owned by someone else in exchange for a portion of the crop yield), and 42.11 percent lease the land from someone else.

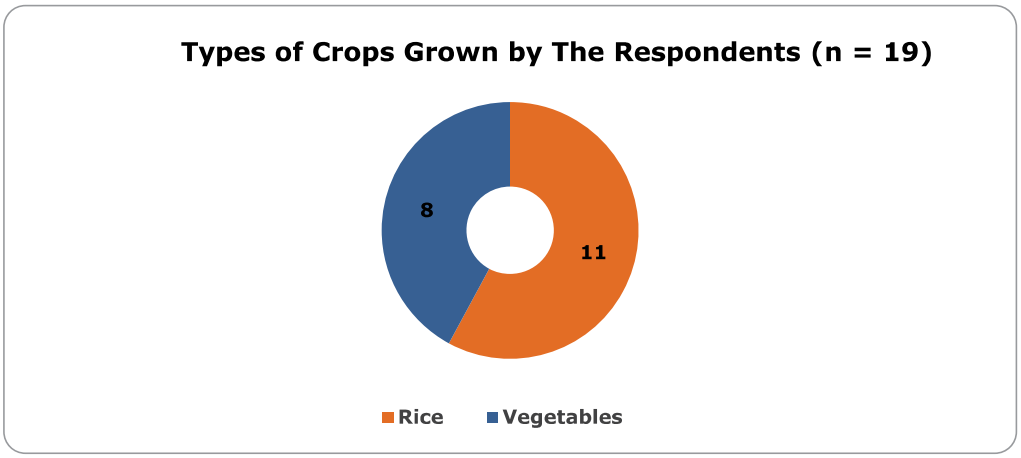

Figure 28: Frequency of respondents who cultivate a variety of crop

According to the 19 people who practice agriculture, the majority (about 57.89%) indicated farming rice, although a sizable portion (around 42.11%) mentioned that they cultivate vegetables.

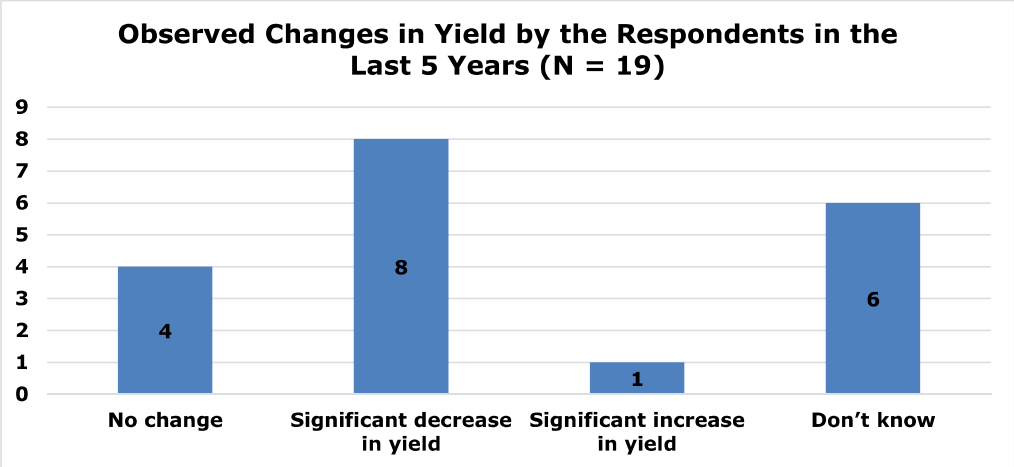

Figure 29: Frequency distribution of observed changes in crop yield by respondents in the last 5 years

The bar chart represents the responses from 19 individuals regarding the observation of changes in crop yield over the past 5 years. In summary, based on the responses of the 19 people inquired, a major proportion (8 out of 19) cited a considerable loss in agricultural output, while a tiny fraction (4 out of 19) claimed no change in crop yield. Few respondents were unaware of the changes in agricultural yield, and only one respondent reported a notable rise in yield.

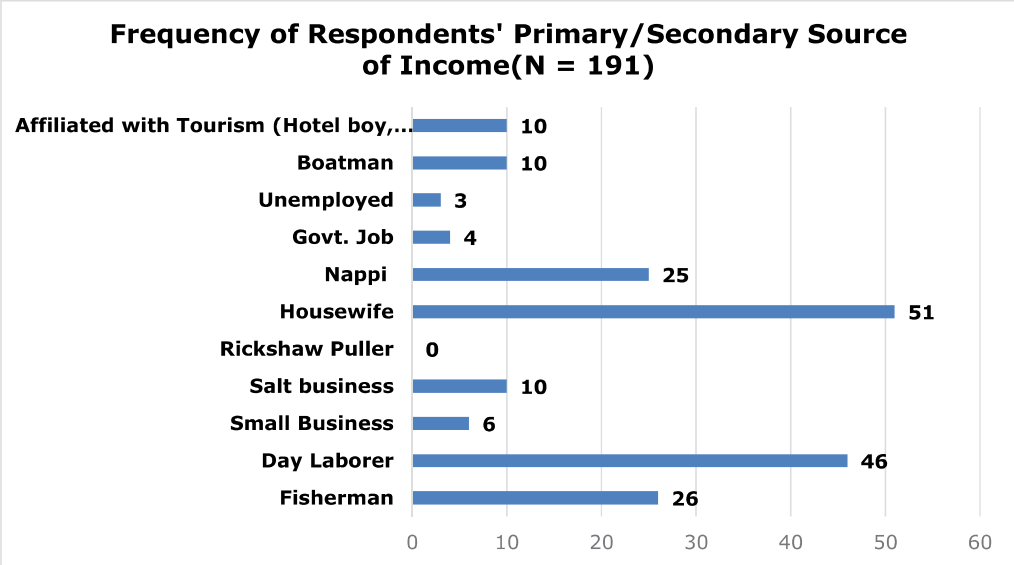

Figure 30: Frequency of respondents' different sources of income

Without including agriculture, the bar chart displays the replies from 191 people indicating their main or secondary source of income. 26 respondents (out of the 191 total) identified fishing as their main or secondary source of income.46 respondents claimed that their primary source of income is day labor. Six people indicated that their small business was either their main or secondary source of income. The salt industry was listed as a source of income by 10 respondents. No respondents indicated that their primary or secondary source of income was pulling rickshaws. 51 people identified themselves as housewives, suggesting that they depend on their partner's salary or other sources for support. "Nappi" was stated as the primary or secondary source of income by 25 respondents. Four respondents indicated that their primary or secondary source of income is from work for the government. Three respondents said they were unemployed, demonstrating that they lack a reliable source of income. Ten people indicated working as boatmen to make a living. Ten more respondents stated that their primary or secondary source of income was from employment in the tourism sector, such as waitressing or working as a hotel boy.

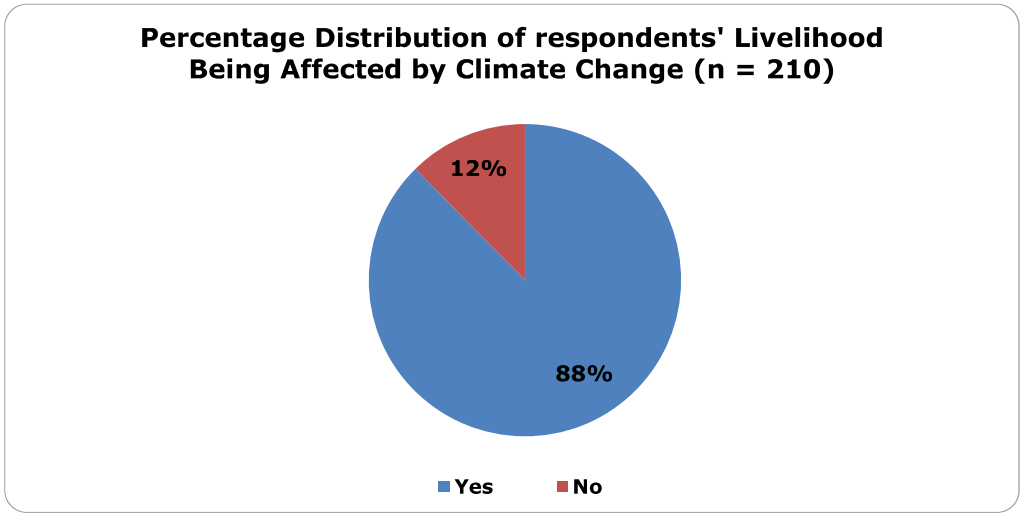

Figure 31: Percentage distribution of respondents' livelihood being affected by climate change

The responses from 210 people discussing how climate change have affected their way of life are represented in the pie chart. In a nutshell, the majority (88%) of the 210 people surveyed indicated that climate change has had an impact on their way of life. 12% of respondents said that climate change has no impact on their way of life. It suggests that people who had faced the impact of climate change are more than 4 times higher than the number of respondents who did not suffer from it.

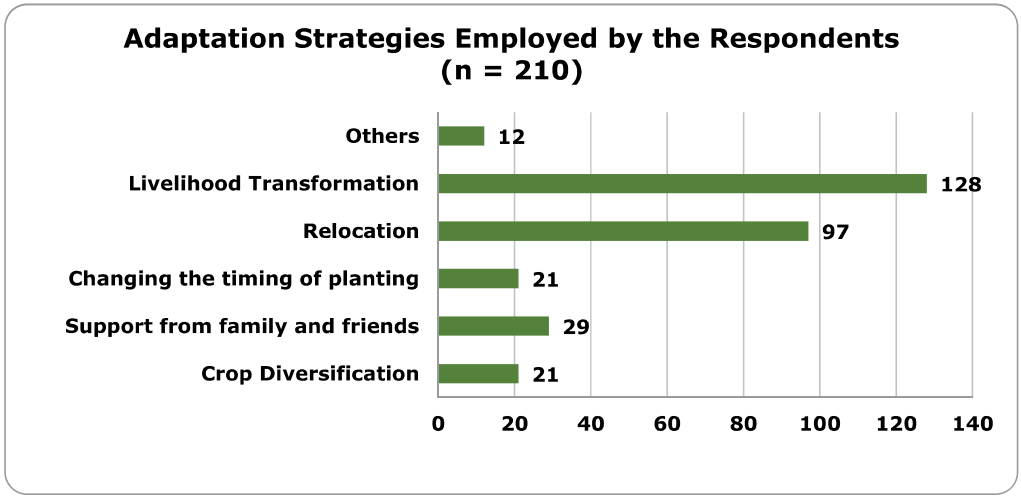

Figure 32: Frequency distribution of adaptation strategies followed by the respondents

The bar chart represents the responses from 210 individuals whose livelihoods have been affected by climate change, regarding the adaptation strategies they have employed. 128 respondents reported employing livelihood transformation as an adaptation strategy. 97 respondents mentioned relocating as an adaptation strategy. This involves moving to a different geographical area or changing the location of their homes or livelihood activities. 21 respondents reported adapting to climate change by altering the timing of their planting activities. 29 respondents mentioned relying on support from their family and friends as an adaptation strategy. 21 respondents reported employing crop diversification as an adaptation strategy. Out of the 210 respondents, 12 individuals mentioned strategies that are not provided in the data of the researchers' questionnaire. This clearly shows that livelihood transformation and relocation is their most employed adaptation strategy in the study areas.

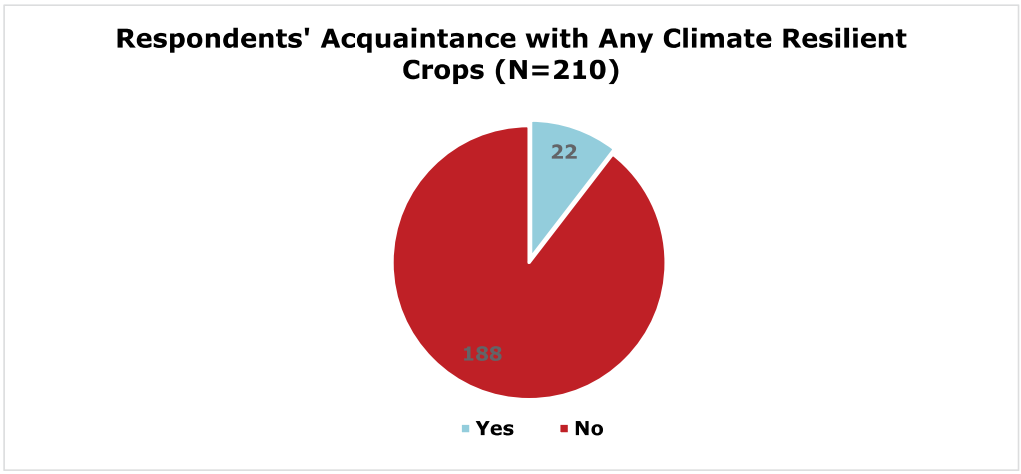

Figure 33: Frequency distribution of respondents' acquaintance with any climate-resilient crops

The responses from 210 people on their familiarity with climate-resistant crops are shown in this pie chart. Only a small number (about 11%) of the 210 respondents who responded to the questionnaire claimed to be aware of climate-tolerant crops. About 89% percent of respondents said they had never heard of crops that are resilient to climate change. So, respondents who do not know about climate-smart technologies are very high in comparison to those who had knowledge regarding that.

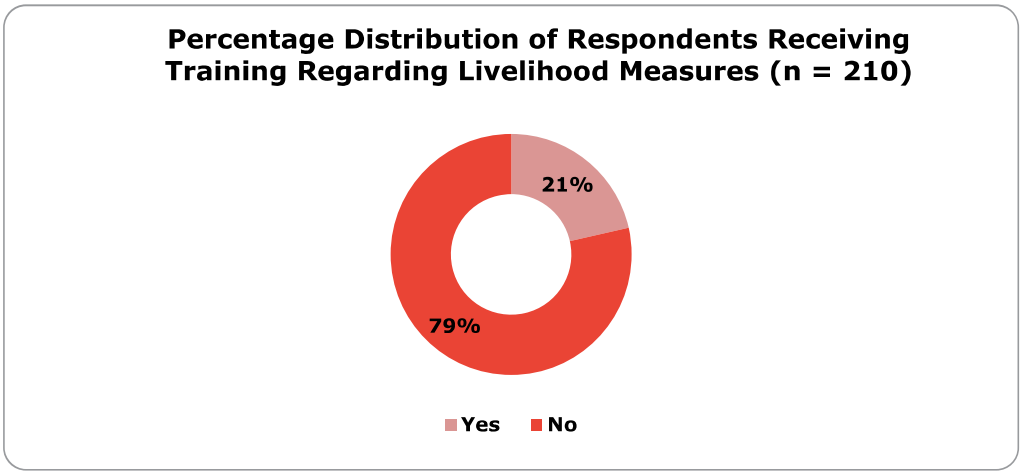

Figure 34: Percentage distribution of respondents receiving training regarding livelihood measures.

The graph represents the responses from 210 individuals regarding whether they have received any training regarding livelihood measures. Approximately 21 percent of the 210 people who responded to the survey said they had received training on livelihood strategies. A large majority of respondents (79%) said they have no training in this area.

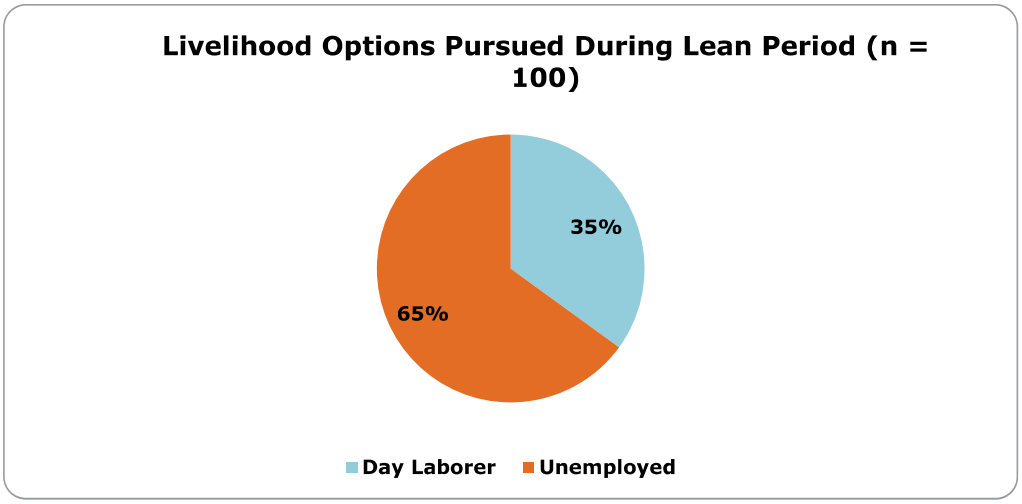

Figure 35: Frequency distribution of livelihood options pursued by the respondents during the lean period.

The responses from 100 people regarding their typical source of income during lean periods are represented here by a pie-shaped graph. A substantial majority of respondents (about 65%), claimed that they usually remain unemployed during lean periods, while the rest, about 35% of them mentioned day laborer as their alternate profession of fishing during lean periods.

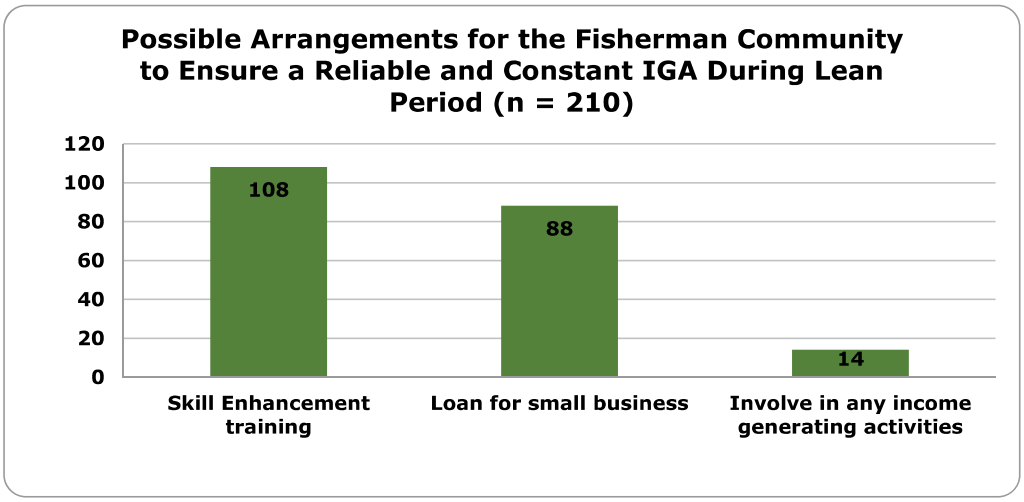

Figure 36: Frequency distribution of opinions about the arrangement for fishermen community to ensure a reliable and constant IGA during a lean period

Based on the responses from the fishermen community, the options that were suggested by the respondents to ensure a reliable and constant income-generating activity (IGA) during the lean period. Out of the 210 respondents, 108 individuals mentioned that skill enhancement training could be arranged for the fishermen's community. 88 respondents suggested arranging loans for the fishermen community to start small businesses. Lastly, 14 respondents proposed involving the fishermen's community in various income-generating activities. These activities could include initiatives like eco-tourism, coastal farming, aquaculture, or alternative livelihood programs, which can provide additional sources of income for the community during the lean period. So, it is clearly seen that importance of skill enhancement training is the most desired option for fishermen to enhance their income and better their lifestyle.

4.7 Status of Social Inclusion

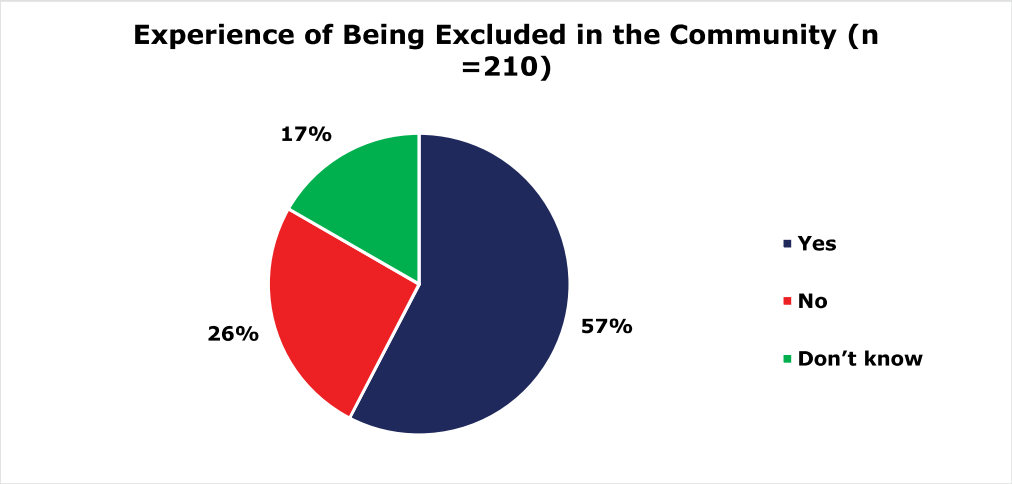

Figure 37: Percentage of respondents feeling of exclusion in the community

This graph shows a representation of the respondents' feelings of exclusion in their community. Majority of respondents' (57%) reported about their feeling excluded in their community. This suggests that a significant portion of the respondents have experienced a sense of exclusion, which could be due to various factors such as social, economic, cultural, or other forms of marginalization within their community. On the other hand, 54 respondents (25.71%) stated that they have not felt excluded in their community. 17% stated that they are unsure of the extent to which they have experienced exclusion in their community. These respondents might feel conflicted or be unable to identify or express how they feel about inclusion or exclusion in their community.

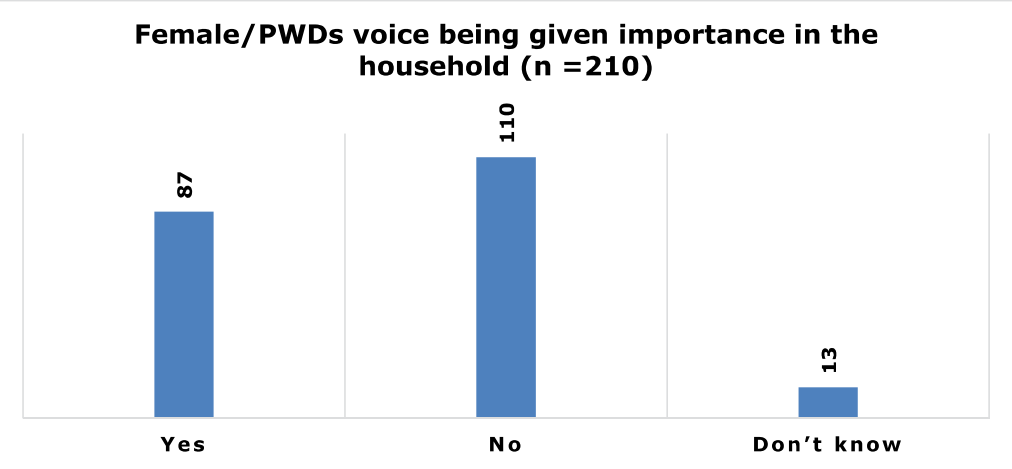

Figure 38: Frequency distribution of valuing opinions of women and Persons with disability in respondents' families

The graph above depicts the respondents' views on how much they respect the opinions of women and persons with disabilities (PWD) in their families. In their homes, 87 respondents (41.43%) said they value the opinions of women or people with disabilities. This suggests that a part of the respondents is aware of and value the opinions and input of these family members. 110 respondents stated that they do not appreciate the opinions of women, people with disabilities, and people from ethnic minorities in their homes. These respondents might not give the ideas of these people the same weight or consideration, or they might minimize the significance of varied viewpoints. Only 13 respondents said they are unsure as to whether they value the opinions of women, people with disabilities, and people from ethnic minorities in their homes.

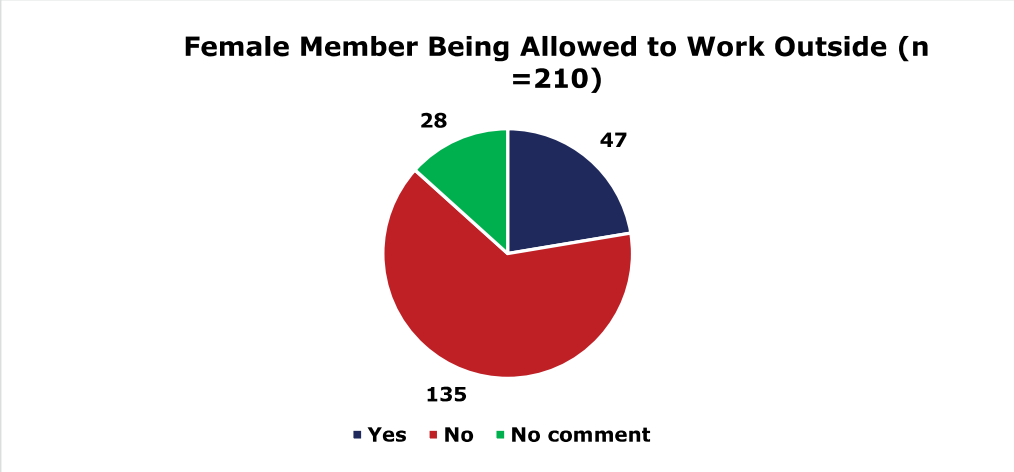

Figure 39: Frequency distribution of female members being allowed to work outside

This graph provides a summary of the respondents' attitudes toward female members in their household working outside the house. 47 respondents (22.38%) said that female household members are permitted to work outside the home. This suggests that some respondents favor the economic empowerment of women and understand the value of allowing them to contribute to the household's income during trying times. Female household members are not permitted to work outside the home, according to 135 respondents (64.29%). In regards to the question, 28 respondents (13.33%) did not offer any comments or responses.

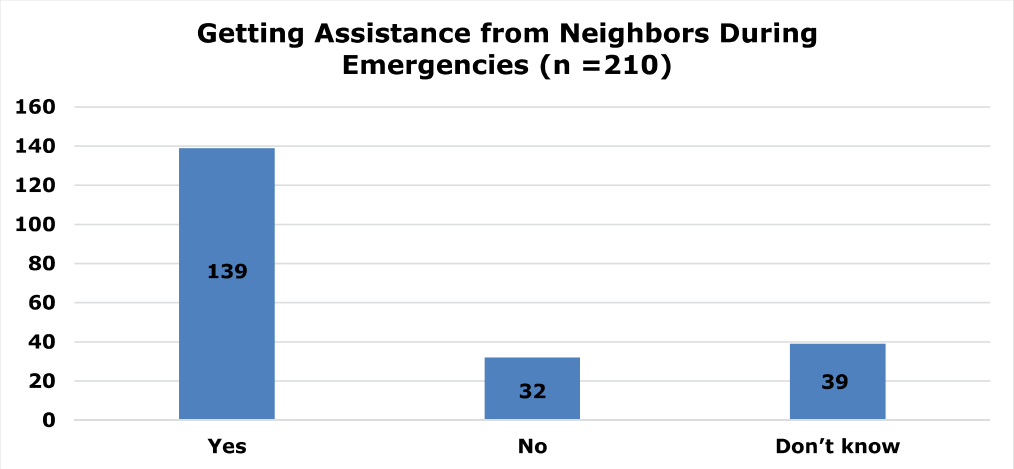

Figure 40: Frequency distribution of persons receiving assistance from neighbors' during emergencies.

The graph above shows the number of persons who get assistance from their neighbors in the time of emergency. A majority of the respondents (66.19%) expressed the belief that their neighbors would help them in the emergence of a disaster. 32 out of 210 respondents stated that they do not think their neighbors would help them in the emergence of a disaster. The rest of the targeted population mentioned that they don't know whether their neighbors would help them in the emergence of a disaster. So, this indicates that a majority of the respondents have a positive perception of the support and assistance they can expect from their neighbors during times of crisis.

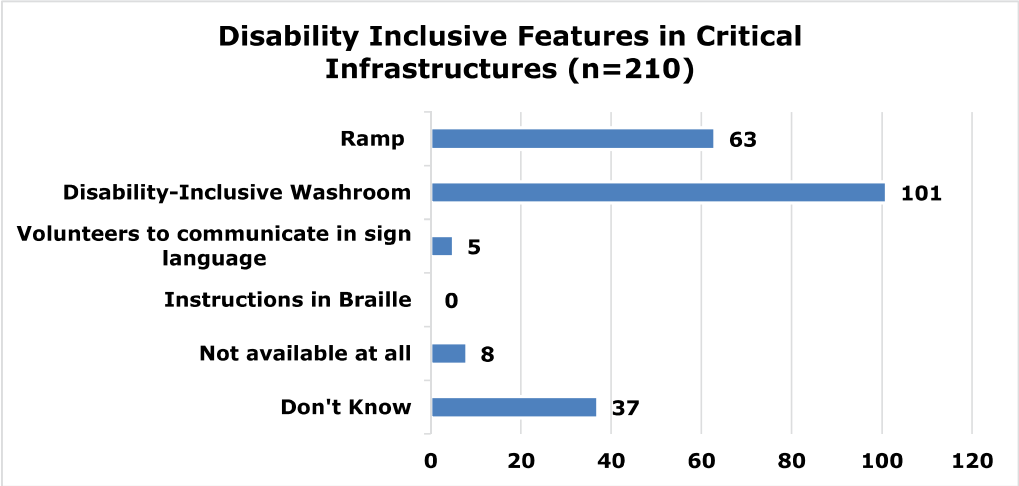

Figure 41: Respondents' accounts of disability-inclusive features in critical infrastructures

This graph states respondents' awareness of disability-inclusive features in critical infrastructures. It is shown that 37 respondents (17.62%) said they were unaware of the accessibility elements that are present in crucial infrastructures. These responders might not be fully informed or only vaguely aware of the specific accommodations made for people with disabilities. Critical infrastructures do not have any disability-inclusive elements, according to 8 respondents. This shows that a tiny percentage of respondents believe that important infrastructures lack accessible measures for people with impairments. Braille instructions are not accessible in any key infrastructures. Some volunteers can communicate in sign language at vital infrastructures, according to 5 respondents. 101 respondents (48%) said that accessible washrooms for people with disabilities were present in important infrastructure. Last but not least, 63 respondents (30%) noted ramp accessibility in important public buildings.

4.8 Internal and External Support

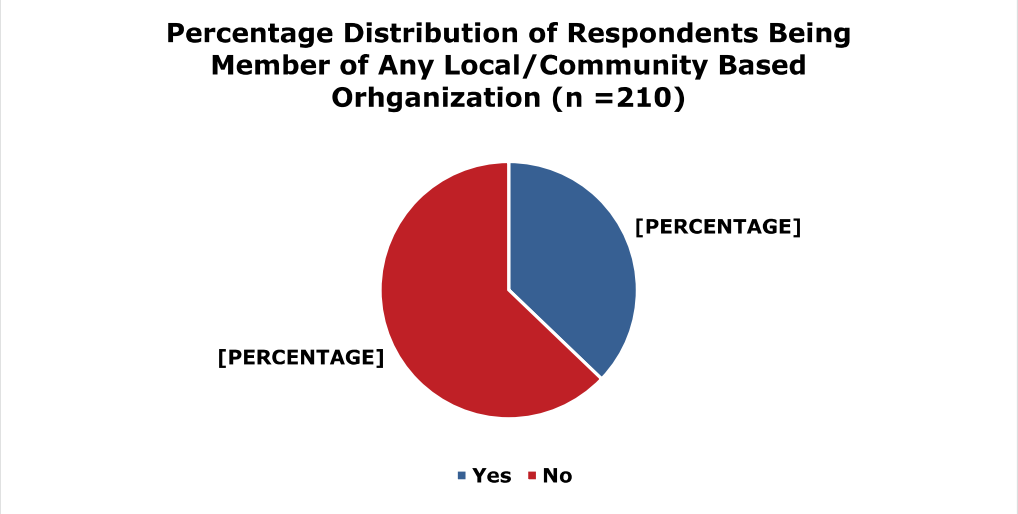

Figure 42: Percentage distribution of respondents being members of any local or community-based organization

This graph shows respondents' membership in local/community-based organizations. Among respondents, 37% reported being a member of a local or community-based organization. These organizations could include community groups, clubs, associations, or non-governmental organizations (NGOs) that operate at the local level and focus on various community-related activities and initiatives. On the contrary, most of the respondents (63%) stated that they are not members of any local/community-based organization. This indicates that the majority of respondents are not actively involved in such organizations.

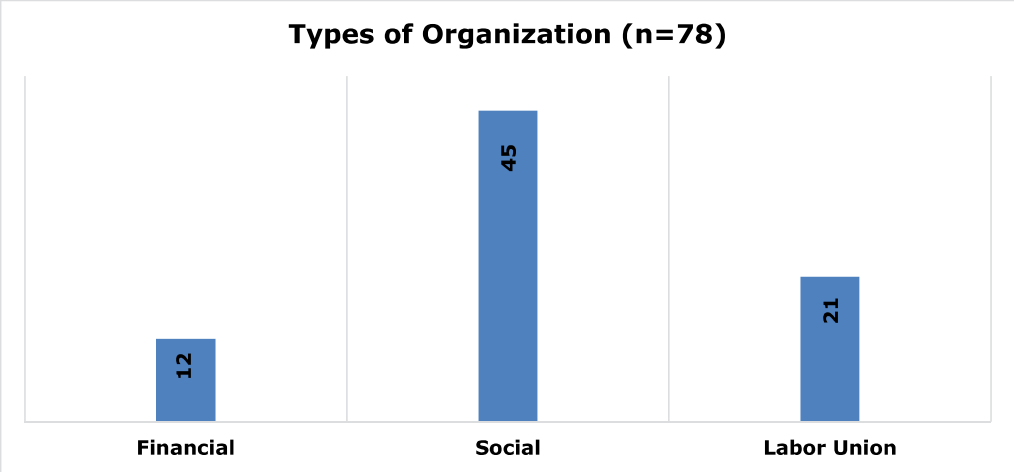

Figure 43: Types of local/community-based organizations where responders have membership.

Various local/community-based groups indicated by the respondents (only by those who are members) are represented in this graph. 12 respondents of those who are members, said their organization is mostly financial. Social organizations were characterized by 45 respondents (57.69% of those who are members). As a result, CBOs in those regions primarily work to promote the local community, encourage social interaction, plan events for the community's culture or leisure, and respond to its social needs. None of the interviewees identified their group as being primarily humanitarian. Also, one of the interviewees identified their group as politically inclined. Lastly, 21 respondents identified their organization as a labor union.

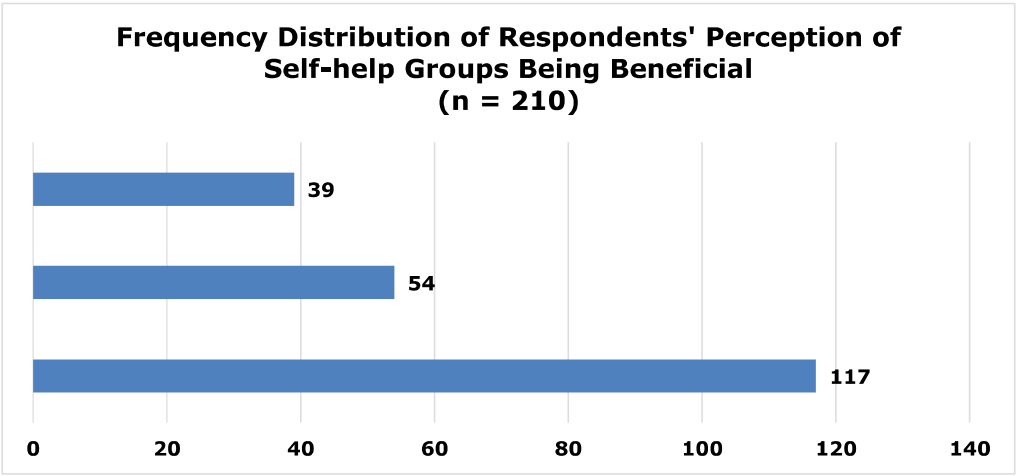

Figure 44: Frequency distribution of respondents' perception of self-help groups being beneficial.

This bar chart provides important insights into whether forming groups or self-help groups would be beneficial for the responders. 117 out of 210 respondents (55.71%) expressed the belief that forming groups or self-help groups would be beneficial for them. These respondents recognize the potential advantages of coming together with others, such as mutual support, collective problem-solving, sharing resources and knowledge, and achieving common goals whereas 54 respondents indicated that they do not believe forming groups or self-help groups would be beneficial for them. Others stated that they don't know about the impact.

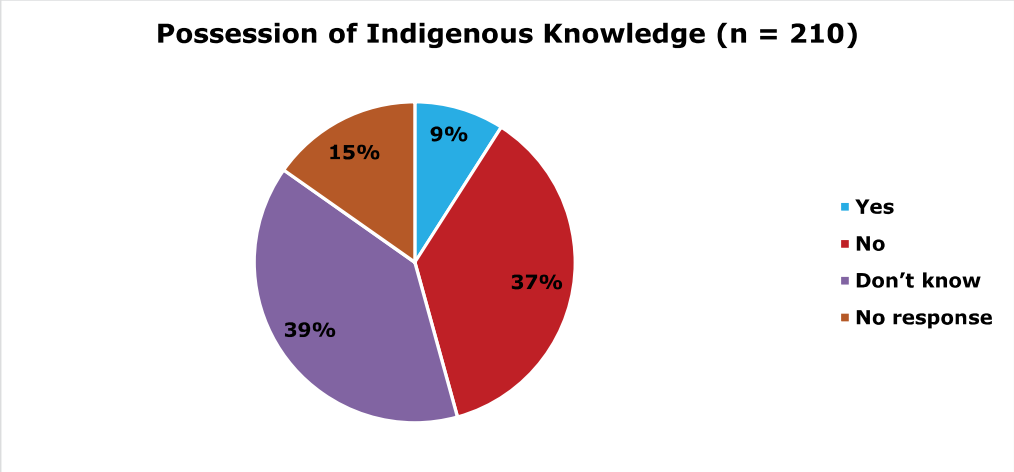

Figure 45: Percentage of respondents depending on Indigenous knowledge.

It is evident from the graph that only 9% of 210 respondents said they had indigenous knowledge or resources to combat the negative effects of climate change or disaster. The majority of the respondents (39%) stated that they do not have any idea about this perception. 37% said they do not rely on indigenous knowledge and 15% did not want to answer this question.

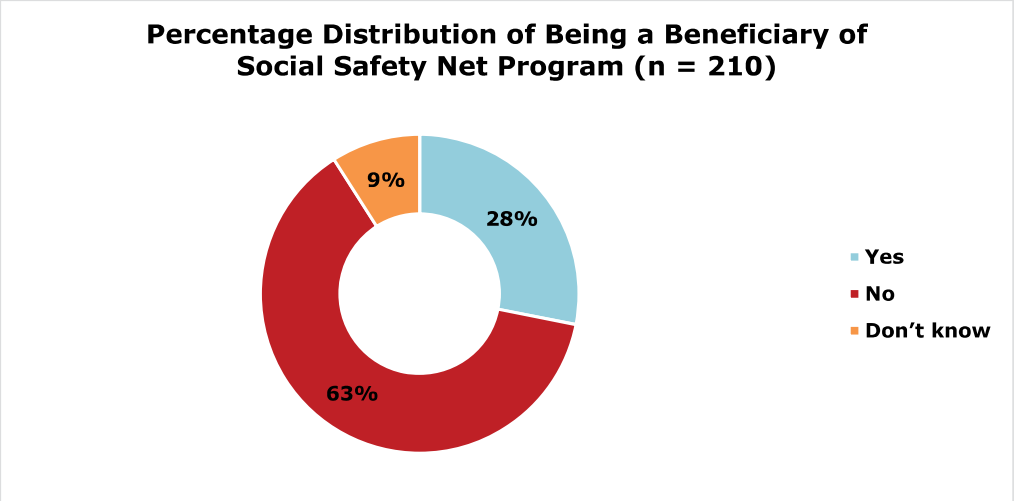

Figure 46: Percentage distribution of respondents who are members of social safety net programs

In terms of social safety net programs, 59 out of 210 respondents reported that they are part of those initiatives. 63% of respondents stated that they have not been beneficiaries of social safety net programs. This indicates that most respondents have not received assistance or support through these programs. The rest of the people in our sample were confused about their membership in social safety net programs.

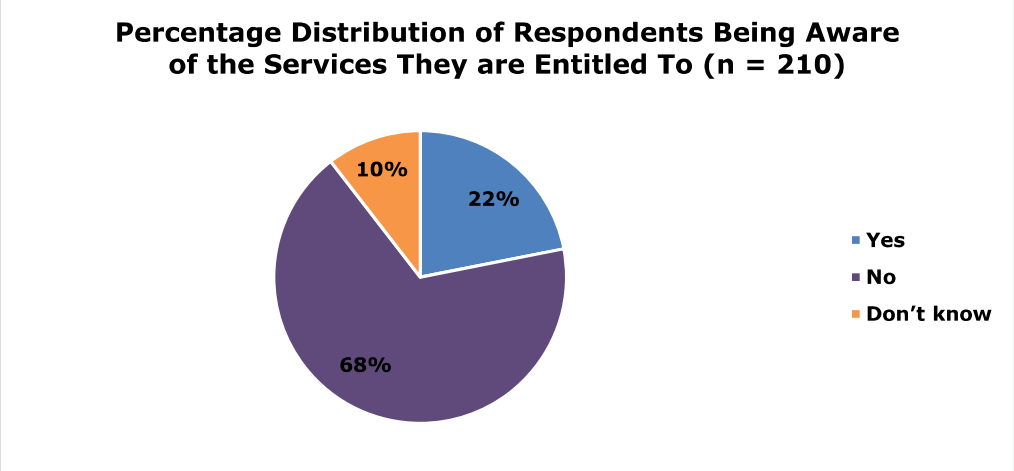

Figure 47: Percentage of respondents' awareness of their entitled services

Information on respondents' knowledge of the government services to which they are entitled is shown in this graph. 46 out of our total sample stated that they are aware of the government benefits to which they are eligible. According to 68% of respondents, they are unaware of the government services to which they are entitled. This shows that a sizable number of the respondents are unaware of the services and advantages they may be able to receive from the government and 11% stated that they are unsure about the government services to which they are entitled. It's likely that these individuals don't fully comprehend their eligibility for some government services or are unsure of it.

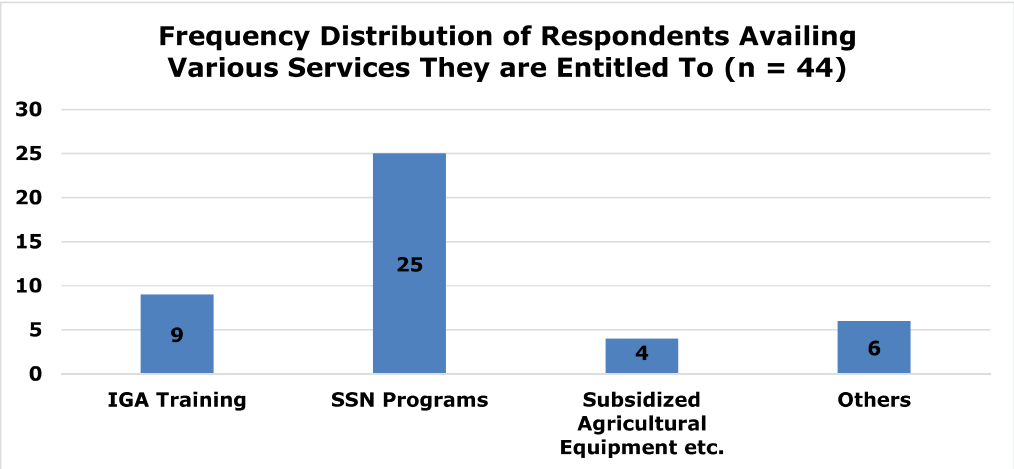

Figure 48: Frequency distribution of different types of services that the respondents get

In response to the question of what type of service they get, 9 out of 44 respondents (20.45%), they had received income-generating activity (IGA) training. To boost people's economic empowerment, IGA training programs work to improve participants' abilities and knowledge in particular income-generating activities, like entrepreneurship, vocational training, or capacity building. 56.82% indicated that they had used SSN programs. Only a few respondents (9.09%) said they had received aid or subsidies for agricultural inputs or equipment. fertilizers. The remaining portion of the respondent mentioned availing of other types of services not specified in the questionnaire.

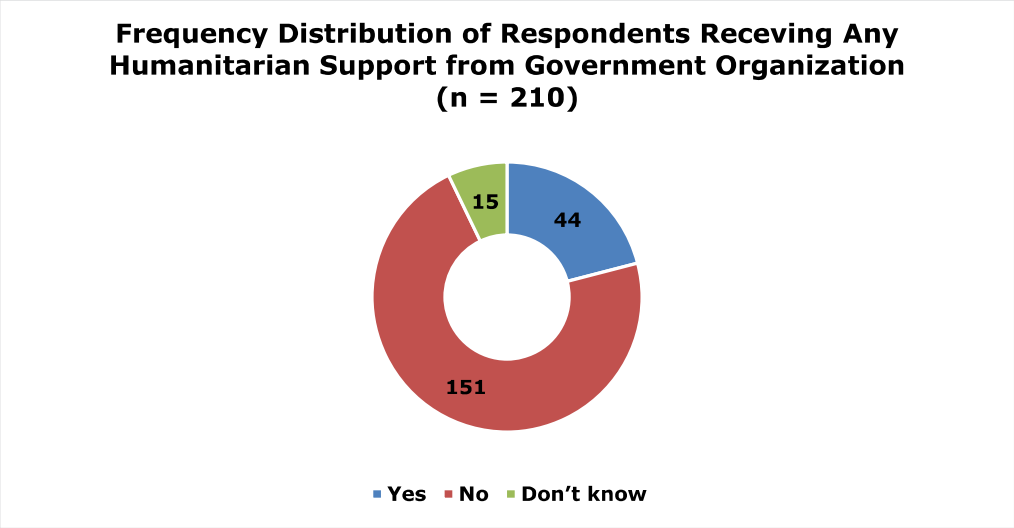

Figure 49: Frequency distribution of respondents receiving any humanitarian support from a government organization

This graph shows the frequency distribution of persons who have received assistance from humanitarian or governmental organizations. 44 respondents (20.95%) said they had received aid from the government. 151 respondents (71.9%) said they had never received humanitarian assistance from the government. This suggests that only a few portions of the respondents had benefited from aid or support from governmental organizations in times of emergencies or disasters. Others said they were unsure of whether they had received humanitarian assistance from the government.

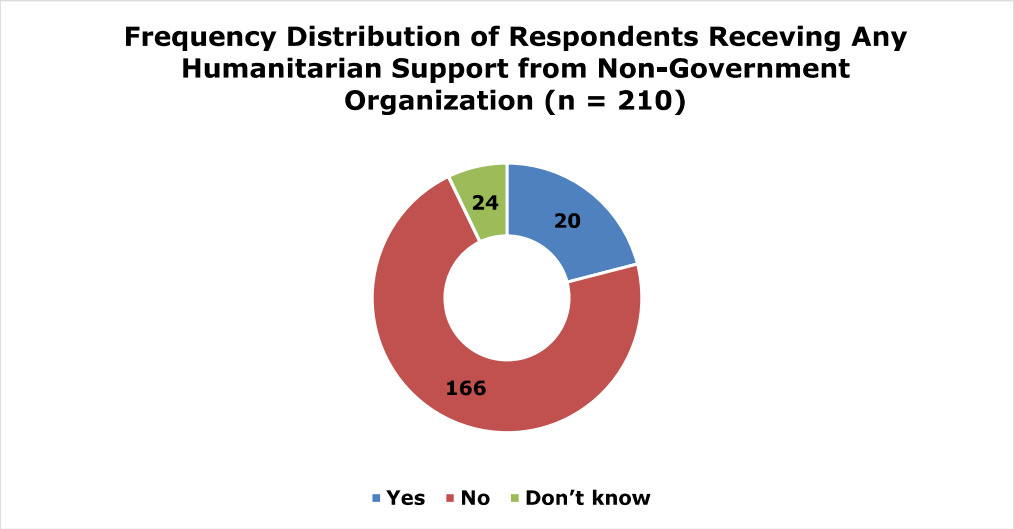

Figure 50: Frequency distribution of respondents receiving any humanitarian support from a non-governmental organization

This graph represents the frequency distribution of persons who have received assistance from NGOs. 20 respondents (9.52%) reported receiving humanitarian support from non-government agencies. 166 respondents (79.05%) stated that they have not received any humanitarian support from non-government agencies. This suggests that most respondents have not been beneficiaries of such support. 24 out of 210 respondents mentioned that they don't know whether they have received humanitarian support from non-government agencies.

5. QUALITATIVE FINDINGS OF THE STUDY

The qualitative part of this study is based on Key Informant Interviews, In Depth Interviews and Focus Group Discussions. This part generated 6 major themes to illustrate the qualitative findings of the study.

5.1 Socio-economic Characteristics of the Targeted Population

5.1.1 Livelihoods and Earning Pattern

The majority of this study's respondents are climate refugees who have recently relocated to Khurushkul Asrayan Prokolpo. Prior to that, they were uprooted from Kutubdia Island and its surrounding areas after the cyclone Gorkey in 1991. These relocations have caused them to lose their former means of livelihood, such as fishing and farming. However, because of their relocation, individuals often have trouble locating good job possibilities. Some individuals have shifted to low-wage informal work or facing trouble finding any suitable job. It was reported by the locals that earlier most of the earning members were engaged in fishing, but now they are forced to join other sources of income and unfortunately, it has led to about 2000-3000 BDT less monthly income than before. In Khusrushkul, most of the respondents migrated from Shomiti Para and it has caused a shift in their income-generating activities. A drastic change has been noticed that fishing activities are less preferred to the habitants because of not having appropriate resources. It was also found that the women's income-generating activities were highly impacted. One of the female respondents from Khurushkul replied,

> *"When we were in Shomiti Para earlier, the women were engaged in farming and rearing cows and goats but after moving here we have no opportunity to work outside the home. No poultry or homestead gardening can be done here due to a lack of space. So, I now have to spend time on household work and looking after the children which I could have spent on any income-generating activity."*

It was seen that the army strictly prohibited the rearing of poultry or cattle and goats inside the Asrayan projects. That is why the residents here cannot come to any agreement with them about what they are more compatible to do for their earning. Many beneficiaries of this project confirmed that if they want to continue their previous work, then they have to go to Shomiti Para and this process is associated with high travelling cost. It is known that it costs about 100 taka per day to go from Shomiti Para to Cox's Bazar, so many people have left their previous jobs there. Earlier many people could make handmade jewelry with oysters and snails but now it is not possible. Also, many have given up sewing because the marketing strategy is very poor in that area and they cannot find their suitable customers to sale those products.

Land conflicts, environmental deterioration and a lack of resources sometimes put ethnic minority groups' traditional livelihoods including farming, fishing, and handicrafts, in danger. Due to a lack of economic possibilities, earnings are lower and there is less economic mobility. Most ethnic people are involved in Nappi processing, storing and selling activities which are not so familiar to them. So, there was a decline in their indigenous earning practices. One respondent from ethnic minority group said that,

"Earlier we had a weaving industry in our community and a large section of the population were weavers who made cloths and home decoration items. Over time, it is a matter of great regret that it is on the way to extinction. This is because nowadays the marketing system of handloom goods is not very poor."

In neither of the two study areas, there were no significant interventions of NGOs for the betterment of their life. Most of the communities admitted that they do not receive any training from NGOs. So, there is no way to use local people's capacity to create new sources of income. Only a few commented that 10-20 years ago they were given scholarships by World Vision. It is known from climate displaced community that in the previous year rice was donated from the union parishad to assist the locals whenever their fishing was stopped but this help has been discontinued by the local government since last year. Currently, due to the increase in the number of dependent people, there is excessive competition for getting help. Individuals from Khurushkul complained that it has been seen many times that the local government only gave allowances or reliefs to acquaintances. In accordance with this issue, the Chairman of this area also faced the huge pressure to disburse any aid and told that

"We cannot provide help to address the need of enormous number of people. We have resource scarcity; I must say and it is difficult to fulfill everyone's demand. To overcome this, I would like to recommend that authority can give assistance to one group at a time. In the other phase of the aid, they should give priority to those who did not receive any support. Duplication of same beneficiary must be avoided to forbear any discrimination."

Lack of institutional training is another important thing that the fish producers are concerned about. Some local dry fish traders said that once they had a dry fish project with a local NGO known as World Fish, and by preserving dry fish with turmeric, they could have exported the fish, but now there is no such opportunity. He also reported that

"Government did not give us any training on Shutki (dry fish), they only forbid us to poison in Shutki (dry fish). Only a few NGOs gave us training on fish farming and poultry rearing. Even government did not provide any agricultural loan to produce cereals with low capital"

5.1.2 Health and Education

It was found that people who have been forced to relocate due to climate change are often at danger of starvation and waterborne illnesses. Their sufferings are exacerbated by limited access to healthcare facilities, and they are more dependent on local healthcare systems or humanitarian relief organizations for medical treatment. Displaced women and teenage girls are the victims of saline water-related skin diseases as they suffer from itching. Their reproductive health is greatly deteriorated due to the use of saline water during menstruation time. Communities and people are also significantly affected psychologically by climate change. Socioeconomic inequities are further maintained by low levels of education. People who have been displaced by climate change have higher levels of stress,

anxiety, and depression due to disrupted lifestyles, lost houses, and worry about the future.

Researchers also explored that many people who have been moved due to climate change, access to education is hampered. Children may have trouble enrolling in and attending school, which may limit their possibilities for education. Interviewees from Khurushkul told that female children face more restrictions to go to school and the underlying causes were high distance to schools, high travel costs and lack of social security through the road. Peoples of ethnic minorities revealed that academic progress is hampered by linguistic obstacles, a lack of culturally relevant curricula, and prejudice in the classroom.

5.1.3 Social Facilities and Security

People who have been displaced due to climate change often lack safe housing and live in temporary shelters or unofficial settlements. They have trouble getting access to necessities like power, energy, and clean water. The residents of the Asrayan project said that

> *"The government has given us houses but there is not enough water facility here. There is no water line up to the fifth floor, we have to carry food and drinking water with difficulty. The water available in the tube well here is quite salty so we have to buy drinking water. During monsoons, water is available properly but during the dry season, water is not available even below 20 to 30 feet. At this time due to lack of water, one person mostly chose to bath or use the water for drinking purposes."*

The condition of social security is not much pleasing in Khurushkul. There are incidents of theft of public goods such as tube wells and livestock. Eve teasing is quite common in that area. Women reported that they have faced harassment multiple times by the local scoundrel. As their neighboring community reported that displaced peoples do not abide by rules and continue unsocial practices, which sometimes leads to fighting with the host community. On the other hand, the socioeconomic options available to Chawfaldandi's ethnic minority populations are constrained by marginalization and discrimination. Due to language challenges, cultural differences, and discriminatory practices, they encounter obstacles while trying to obtain public services like education and work.

5.1.4 Child Marriage and Dowry Practice

Both in Khurushkul and Chawfaldandi unions, there was no practice of child marriage since the local people know that it is a social crime and if anyone commits it the family can get arrested. On the contrary, there are strong socio-cultural expectations around the payment of dowry. It is often seen as a custom and a technique to highlight the social standing of the bride's family. The bride's family bears a heavy financial weight as a result of the dowry custom. They are required to give the groom's family a variety of things, including money, jewelry, household goods, and perhaps even real estate. The bride's family may experience debt, destitution, and financial distress as a result of this financial responsibility. The rate of child marriage is low but the dowry system is still observed in a large amount in Khurushkul and Chawfaldandi. One respondent of Chawfaldandi said,

> *"If someone wants to get married, now it is mandatory to give dowry. No one wants to marry a girl without giving dowry. Last year a girl from my family had to give 5 lakh takas to the groom's family because if given in marriage without dowry- girls are tortured, in-laws beat them and the marriage breaks up as a final result."*

This supports uneven power relations and jeopardizes the autonomy and rights of women in that society. If families fail to satisfy dowry expectations, they often experience social pressure and stigmatization. Even if it strains their financial capabilities, families may be forced to abide by dowry demands out of fear of social judgment and marginalization.

5.2 Disaster Related Information

Disasters are common occurrences in the lives of respondents in the study area. The population of the study area is vulnerable to various natural disasters such as cyclones, storm surges, coastal flooding, salinity intrusion, etc. This study's respondents acknowledged that, in recent years, the severity of prevalent disasters has not been a significant burden for them, whereas climate variability has become a new concern. One of the respondents from the study area described the issue as below;

> *"We have been victims of multiple disasters for the majority of our lives; we have grown up with them. In recent years, the severity of these natural disasters has been somewhat tolerable, but rising temperatures and erratic rainfall have become a hazard to our lives and livelihoods. It creates a significant problem for those involved in the trade of dry fish."*

Nevertheless, individuals are impacted by storm surges, coastal flooding, and cyclones. Some areas are experiencing mild salinity intrusion, and others, particularly climate refugees who have been relocated to a new settlement, are experiencing water scarcity issues. Over the past 5 to 10 years, the greater portion of disaster-related effects have been concentrated on the respondents' means of livelihood. Additionally, health, education, and housing were affected to some degree.

A single disaster can drastically alter the course of a big community's life as well as the lives of future generations. This is exactly what happened to the majority of the participants in our study who were displaced from their homes due to a disaster and were later classified as climate refugees. The devastating Cyclone Gorkey of 1991 resulted in extensive damage to nearly one million homes, causing prolonged hardship for affected individuals (Hadi et al., 2021). According to the respondents, the individuals currently residing in Cox's Bazar as climate refugees were primarily inhabitants of Kutubdia Island, which is an Upazila located in Cox's Bazar, with a smaller number originating from the Barishal division. A senior citizen from the community of climate refugees narrated the issue below;

> *"Before the 1991 cyclone, we had our own house and land." Except for our lives, the cyclone took everything from us. We are now living a horrible existence here, relying on the government and other agencies for assistance in obtaining permanent residency. I'm not sure if our misery will ever end."*

The majority of individuals who have experienced displacement due to disasters have relocated within their respective districts. However, a minority of individuals have migrated to the displaced community from areas outside of Cox's Bazar. The phenomenon of displacement continues to persist, with intra-district displacement being the predominant trend observed in the study area.

In recent years, the practice of early warning dissemination systems has changed dramatically for the better. It was difficult to identify anyone who had not received an early warning message before a disaster. The Union Disaster Management Committee (UDMC), with the huge assistance of CPP volunteers, regularly distributes early warning messages and assists people in the event of cyclone shelter shifting. The UDMC does extensive miking throughout their union, while CPP volunteers move from door to door delivering early warning messages to individuals.

In addition to technology-based early warning systems, it appeared that the respondents of the study area rely on indigenous early warning forecasting methods. The senior citizens and fishermen are the specialists in this instance because they have extensive knowledge of the local weather and environment. Assessment of the direction, speed, and intensity of the wind, as well as the size, frequency, and force of the waves, allows them to detect abnormalities that signify an approaching cyclone. Moreover, their deep knowledge of seasonal cycles and weather patterns assists in comparing current conditions to historical data, enabling them to make informed decisions regarding fishing trips and respond appropriately to potential cyclones. Members of the coastal community, including fishermen and those involved in the dry fish industry, frequently rely on indigenous warnings in making their disaster preparedness decisions. These techniques are not very precise or accurate all the time. Yet, these indigenous techniques, which are developed and refined over generations, have proven to be valuable in providing early warnings of cyclones to coastal communities and fishermen. While they are not as precise as modern technological systems, they play a crucial role in complementing formal warning systems

The use of cyclone shelters varied according to respondents' location; individuals who live near the sea and are more exposed appear to visit cyclone shelters more than those who reside in less risky locations. Furthermore, due to less severe cyclones in recent years, many people have chosen not to visit cyclone shelters. Regarding the tendency to visit cyclone shelters a young female respondent stated as below;

> *"The impact of cyclones hasn't been very severe in our area lately and that's why many people do not go to shelters. In addition, there are different difficulties e.g., toilet use, inadequate space, etc. in shelters. Yet, some people, including myself, are afraid of cyclones, and when we receive a warning message, we rush to cyclone shelters."*

Disaster risk training or sessions did not appear to exist in the study area. Respondents were not well informed about such training. They are, nonetheless, interested in acquiring such training.

5.3 Climate Change and Its Impacts

Significant effects of climate change are currently being perceived at Cox's Bazar as it is located beside the coastline along with the Bay of Bengal. It is extremely vulnerable to the effects of coastal erosion, storm surges, and sea level rise because of its proximity to the ocean. Researchers of this study found that the capacity of people to successfully adapt and address climate-related concerns is hampered, specifically in Khurushkul and Chawfaldandi, by poverty, limited access to resources, inadequate facilities, and weak governance. In those two unions, the following signs of climate change have been observed and reported by the community people-

5.3.1 Temperature Increase

The average temperature is rising in Cox's Bazar, which is a blatant sign of climate change. Increased heat-related health concerns, such as an increased risk of heat-related illnesses and heat waves, are affecting the most vulnerable groups like climate migrants and ethnic minorities. Increased water needed for irrigation, altered flowering, and fruiting cycles, and impacted crop development are all effects of rising temperatures that influence agricultural output. Farmers in Cox's Bazar may experience decreased yields and financial losses due to heat stress. Temperature rise is concerning the growing pattern of seeds and fish. A school teacher in Monupara, the neighboring Muslim village beside Khurushkul said that

> *"Due to the rising temperature and over-extraction of trouts, the fish are currently decreasing. You can see that different types of fish are not seen in the market now. As before fish were abundant, now there is a shortage. Locals predict that after 20-25 years several fishes will be extinct. For this reason, fish must be caught hand-to-hand by hooking. If the troller cannot be stopped, there will be no fish gradually."*

5.3.2 Sea-Level Rise

Khurushkul and Chawfaldandi's low-lying coastal parts make it extremely vulnerable to sea level rise. Saline intrusion happens as sea levels rise, damaging the freshwater supplies of these two places. The availability of freshwater resources generally, irrigation for agriculture, and drinking water supplies are all impacted by this salinization. Local people stated that they suffer from diarrhea and seasonal flues more frequently than before. Additionally, in that area, coastal erosion is accelerating due to rising sea levels. Due to erosion, communities are uprooted, infrastructure is harmed, and land is lost. Moreover, it endangers the sustainability of ecosystems like mangroves, which act as natural barriers against storm surges, as well as the livelihoods of coastal residents.

5.3.3 Changing Patterns of Rainfall

Climate change has caused the weather in Cox's Bazar to be unpredictable. People of Khurushkul and Chawfaldandi told that they have noticed changes in rainfall patterns, such as prolonged droughts or abruptly excessive rainfall, that have an impact on agriculture, the availability of water, and the health of the ecosystem as a whole. Cox's Bazar is also exposed to devastating cyclones due to its position. Climate change has increased these extreme weather events' frequency and severity in those areas. Extended dry spells and drought periods are also a result of climate

change. Rain-fed agricultural practices that depend on regular seasonal rainfall are hindered by prolonged dry spells. They also stated that those areas are mostly impacted by cyclones which result in significant infrastructure damage, fatalities, community uprooting, loss of crops and livelihoods, and a lot of rain, wind, and storm surge. Crop yields are down, conventional agricultural practices are disrupted, and the lives of rural communities are impacted. On the other hand, those places are facing increasingly frequent and powerful rainstorms which could cause floods. People of Khurushkul said that the number of fish that was in the sea earlier is not available due to the decrease in rainfall. When it rains, there is enough fish in the sea, but at other times there is not much fish. It also affected the displaced peoples' income. One respondent said,

> *"Now the rainfall is much less than before. When the rainfall decreases, the sea dries up and there is not enough fish in the sea. Since there is no fish in the sea, we have to sit for about six months. As a result, the income is much less than before."*

5.3.4 Modifications of the Winter Season

It has been found that the communities of our study areas have become a victim of climate change. Respondents from Khurushkul and Chawfaldaundi noted that, as a result of rising temperatures, their environment has generally had winters that are warmer with fewer and less severe cold spells during the past 5-7 years. This affects the components ecosystem including plants and species that are habituated to seasonal temperature variations. Crop cycles and agricultural practices are impacted by changes in the winter season. Some crops that need particular winter conditions may have trouble adjusting to warmer winters, which affects local agriculture and farmers.

5.4 Present Livelihood practices and how it is linked with the Cyclone of 1991:

Occupation related to fishing is the prime source of income for the people of the study area, only a meagre number of local people involve themselves in agricultural work, dried fish business and salt business.

The work related to fishing is not just limited to catching fish, some of the people who refer to themselves as fishermen are only owners of the boats/trawlers used for fishing who rent them in exchange for fair, and some are sailors of the boats/trawlers, some others are vendors of the fish in local market and rest are exporters of the fishes in neighbouring urban areas. Vendors and exporters outnumber the other fishing-related income groups. There is common malpractice of assembling a bunch of fishers under a 25-30 days deal for fishing in the deep sea. The deal is mainly made by greedy boat/trawler owners, also known as "Bohoddars". But during the lean period, they sit idly at home living off of their savings where some employ themselves as day-labourers for this period. Women who are in charge of livestock acknowledged as housewives try to take part in other income-generating activities like tailoring, cooking for hotels and other diurnal activities during the lean period.

The attenuated number of people who are involved in agriculture-based work are

either land owners or sharecroppers. Farmers of this region mainly produce rice as other crops have reduced yields due to the longitudinal climate change impact on the geographically challenged location. Speaking of which Chairman of Khurushkul (ward no. 9) mentioned that,

> *"Fishing is the predominant source of livelihood for many people in this area. The rest are farmers and salt businessmen. But farming is not quite apt as the lands are not arable enough for crops other than rice."*

But due to the increased infertility of arable lands, farmers are not benefitting enough, in some cases facing losses and with the longitudinal impacts of climate change and the devastating cyclone of 1991, there is not enough fish in the sea to catch and vend. So, the new generation from these deprived families is more inching towards better livelihood opportunities. As the young generation is getting educated and started moving abroad, this evidently implies that the number of fishermen is soon to be dwindling. People are starting to be more inclined towards money sent from overseas, as a result of which number of immigrants from this area is escalating with time. Insights on the immigrants have been reflected by the Chairman of Khurushkul:

> *"People mostly move to Saudia Arabia, Dubai and other Middle East countries from here. As of now, 30% of the whole population has become immigrants, many of which used to be trawler-owners before. These trawler-owners knew the route to Malaysia, so they either shifted legally or fled the community."*

Conversing about the emerging income source of people of Chawfaldandi Muslim community, one FGD respondent from the community uttered that,

> *"Other than fishing, farming and salt business, remittance has become the emerging source of economy of this area."*

However, the driving force of the economy of the climate refugees has been decelerating and facing uncertainties ever since they have been displaced to Khurushkul through the Asrayan project. This refugee community has been living in Khurushkul for 2-3 years but has not been able to find a durable source of income for staying put. They are being forced to adapt to several livelihood practices. Some of the new sources of livelihood are solely tourism-centric such as the work of hotel boys, cooks, and cleaners. Some are employing themselves in betel leaves gardens. Adding a religious dimension to the selection process of their livelihood, the chairman said that,

> *"Unlike the fishing sector and salt businesses, Hindus mostly work in betel leaves gardens. Muslims are more likely to involve in fishing and salt businesses."*

Another livelihood group is businessmen of dried fish who are engaged in collecting, making, transporting and merchandising dried fish. Talking about his business of dried fish, one FGD respondent who is also an owner of a dried-fish production centre mentioned

> *"If the production is good, we sell up to 70000-80000 BDT worth of dried fish a month to city areas. But during the 6 months when we don't have any work, we sit idly. Poor ones try to engage in day-labouring activities, but we don't find it necessary in my production centre."*

However, it has appeared that trying to adapt to various livelihood practices hasn't pacified their lives, instead turned it into a labyrinth of complication. Because of the poor transportation system that are linking the Khurushkul Asrayan community with neighbouring areas, people are forced to spend a lot of money on transportation fair, as a consequence, their share of profit in any livelihood opportunities is tapering off. Reflecting on the misfortune, one FGD respondent from the Khurushkul Asrayan community mentioned in a gloomy voice,

> *"Those of us who work at hotels pay an amount of 200 takas (more or less) daily. Doing this every day leaves us with very little money at the end of the month. This excess fare that we are having to pay for commuting is taking a toll on our children's education. They are dropping out of school at an early age due to our unaffordability to pay the bill."*

The misery doesn't end here. School dropout girls are less likely to be chosen for marriage, even with a high amount of dowry. Dowry-like social stigma has a devastatingly strong grip on the community. According to a widow FGD respondent who is also a mother of 2 daughters, parents are being destitute to marry their daughters off to their husband's home because of dowry. There is no active or visible law to prevent dowry in this area.

Even though a bridge construction project is being worked on, after the completion of which the hardship, expense and discomfort in communicating will be assuaged. But the absence of social harmony among the neighbouring communities regarding livelihood options always gets overlooked by the government. According to one respondent, it has been quite clear that the refugee community from Khurushkul and the previous community aren't getting along. The previous community thinks of the climate refugees as outsiders, resulting in their exclusion from any social process. The previous community has also been seen to believe that the refugee community is snatching all the available livelihood opportunities leaving them unemployed. Putting the responsibility of the previous community's unemployability on the refugee's shoulder has helped to sketch out the direct economic impact. Indirect economic impact due to the existence of the refugee community on the previous community has been brought about by an FGD respondent,

> *"After the refugees have come here, prices of vegetables have hiked uncontrollably. Vegetables that used to be 20-30 BDT have now become 70-80 BDT in price. Meat products with a price of 300-500 BDT have sky-rocketed to 800 BDT. This price hike is putting a significant impact on our economy. There is also a shortage of food items in the local market which has happened due to the sudden excess demand of food products led by the refugee's accommodation."*

These direct and indirect impacts on their economic condition pushed the community to shift to an alternative livelihood system. Before moving in, the majority of the Asrayan community used to be char-dwellers whose main source of income was fishing. Those not involved in fishing, at least had a fixed job such as the job of a security guard or a day labourer. But after the dislocation, fishing is not a viable option anymore. With an already-impacted economy, some of them are now working as day labourers on any construction site or as cooks in hotels or running businesses related to dried fish or serving as Imam in mosques to cope with their fragile economic condition. One FGD respondent mentioned that

> *"Earlier I used to be a security guard with a fixed monthly income of 8000 BDT but after shifting to the Asrayan project, I have become jobless, I do whatever I can to earn and feed my family. Some days I do the unloading and most days there isn't any work to do. The scenario is almost the same for everyone in the community here. Fishermen who used to have a monthly income of 15000-20000 BDT can now earn 10000 BDT only."*

It can be drawn that whether people of the Asrayan community adapted to an alternative livelihood or not, their economic condition has been hampered still. From fishing to day labouring, each livelihood option (whether it be for the refugees or the hosts) has been utterly impacted in meeting the massive onset of demands of the refugee community. People are still suffering from economic instability despite receiving developed housing facilities. Sharing his sorrows, one respondent said,

> *"Before the 1990 cyclone, I owned 40 decimal lands. Now I have all these luxuries of living in a 5-storey building but at the cost of what? I don't have a steady job or a stable economic condition. The housing facilities are helpful of course, but it would be fruitful only when paired and provided with a decent job or some sort of monetary atonement for the loss I have had."*

FGD with the Rakhine community in Chawfaldandi almost portrayed a similar scenario. Just like the Khurushkul communities, people from the Rakhine community used to be fishermen mostly before the 1991 cyclone. But one single natural disaster reshaped the entirety of their and their successor's livelihood and lifestyle. After the cyclone, people started losing interest in fishing due to uncertainties in the sea and climate change-induced lessening of fish. For several external factors like the domination of the Muslim community in the fish-market system, abounding vendors in the market and inflated cost of livelihoods, the cut-down number of fish couldn't bring enough profit. So, people started shifting towards small businesses like making bamboo-made packaging, gold business or day-labouring such as work related to Nappi (Nappi is a fish-foodstuff made through fermentation) producing and merchandising.

Among all these present livelihood options, the gold business seemed to be more beneficial for the Rakhines. But due to its demand-centric nature, uncertainty remains. The ones making bamboo-made products have to face a lean period as the rainy season makes it hard for them to work with bamboo, also price hike of bamboo has, once again, depreciated profit a lot. Again, the nappi market started to be more competitive gradually with numberless vendors leading to less profit. According to one FGD respondent,

"I have been involved in Nappi-making since 2018 with an income of 4-5 thousand BDT monthly, but now the profit has dropped surprisingly and I can't live with it."

Rakhines are now willing to relapse into their golden history of hand-loom business. Reminiscing old days, one 50-years-old female respondent said:

"We used to make our daily clothes (thami) with our handlooms 20-30 years ago. Back in the 90s, we still had a deficiency of capital and profit, but we had customers as well. But now with varieties of products in the market, people have so many items to choose from. Hand-loomed products seem simplistic and less attractive in comparison with other products. With the growing indifference toward this unique form of art, handloom businesses are becoming extinct now. If it is to restart, training should be provided first as the present generation knows nothing about it."

5.5 Status of Social Inclusion

This section of the research aimed to provide a comprehensive analysis of the social inclusion status of the major groups studied in the study area. The first part of this section investigates whether there is any form of social exclusion among different studied groups e.g., climate refugees, the Rakhine community, and Chawfaldandi Muslim community. A substantial level of social exclusion is found among climate refugees, according to the study. After the 1991 cyclone, the climate refugees initially relocated to a location known as "Shomiti Para"; however, a portion of them have recently been relocated to the Khurushkul Asryan Prokolpo, which is the largest climate refugee rehab project in recent history. According to the inhabitants, they face complete exclusion from the neighboring community. They are regarded as outsiders within their own district. One of the respondents to the Asryan Prokolpo cited the issue as follows;

"Since our arrival, we have been subjected to nonstop harassment. They mistreat us on the roads, in the markets, and on the workplace roads. We hope that once the construction of the new bridge and roads are completed, our suffering will lessen"

Researchers made an effort to look into the situation by interviewing members of the neighboring community and the local representative. It was discovered that a new community in that location reduced the employment opportunities of the previous community to some extent. Besides intermittent discord among the youth of these two communities resulted in some disruption, which was subsequently resolved. The local representative of that area provided his insight regarding the matter as follows;

"This region's economy is weak, and as a result, employment opportunities and other minor issues have sparked a dispute between these two communities. For the climate refugee community, a specialized employment generation center is being established; once it begins operations, these concerns will be eliminated."

Additionally, this section investigated the level of social inclusion of women and people with disabilities in the community. In terms of women's inclusion, the scenario for climate refugees and the Rakhine community was nearly identical. These two communities agreed that they respect the opinions of their female members and are welcoming of women who work outside the home. However, the Chawfaldandi Muslim community is hesitant about the issue. Typically, the male members make all significant decisions and prohibit their female members from working outside the home. The female inhabitants of this region are also hesitant to work outside the home; they prefer to engage in income-generating activities at home. Persons with disabilities are entitled to social safety net programs. Apart from this, they are not provisioned with any other services which might improve the quality of their life. Moreover, the critical infrastructures of their area are mostly disability exclusive.

In general, females and persons with disabilities are the most vulnerable population in the study area. Limited economic access, a lack of WASH facilities, social barriers, and a variety of other challenges all contributed to their vulnerability. These people are given less importance in societal decision-making.

5.6 Internal and external support system

5.6.1 Government Support

There are ongoing Social Safety Net programs such as Elderly allowance, and Widow allowance in the study area. Besides the vulnerable group, there are several government interventions for different occupational groups as well. Conducting training, and establishing fish distribution centres for fishermen are commonly visible in the area. Not just men, women from female-headed households are also provided with seeds, fertilizers and agricultural training for establishing self-reliance, economic stability and reducing vulnerability. Married women in the community want to learn through several alternative livelihood training regarding tailoring, boutique-house, parlours and other indoor money-making activities to support their fishermen husbands during the lean period. One female FGD respondent demanded support in her language saying,

> *"Along with a fish distribution centre for the males, females of our community should also be supported in reconstructing our livelihood as much. We received such training regarding livelihood opportunities once-twice only. But for this whopping number of housewives who want to support their husbands eagerly, one or two training aren't enough."*

The interventions are also undertaken in an attempt to meet local people's contextual needs. A government-funded fish distribution centre resembling one in Thailand is under construction for the welfare of the 4500 fisher households in the Asrayan community. This was a mass demand by the people of the refugee community as they had spitefulness toward the previous community. To avoid the over-stretched dispute, the Asrayan community urged any fish/dried fish distribution centre to be in their proximity.

Department of Fisheries distribute rice to the poorest ones but multi-dimensional discrepancies are associated with it. The number of beneficiaries in need outweighs

the number of beneficiaries receiving it in a tone of discrimination and inequality. Also, only rice distribution doesn't seem to be enough for satiating the pool of needs that community people have. As part of the training, the Department of Fisheries also provided training on dried-fish production, storing and merchandising that directly or indirectly focused on guiding local people with information on what to do and what not. One dried-fish businessman shed light on his experiences over the training here,

> *"The training conducted by the Department of Fisheries were quite helpful for all of us. We received guidelines on the size of the fish we needed to catch for making dried fish while maintaining the biodiversity of fisheries in the sea and learnt which pesticides are venomous and not to be used in the making and how the proper usage of the permitted number of pesticides carry the remarks of the production of dried fish."*

5.6.2 NGO Support

Also, training sessions regarding small-loan services, livestock gardening and electrical work have been provided by several government cooperative societies and non-government organizations. NGOs provide training on health services and run awareness-raising campaigns. Among several NGO interventions, fish drying platform (macha) donation is mention-worthy. Such more training is coveted by the locals.

For the loan-providing services, clients of the cooperative societies take an amount of non-refundable 1200-1300 BDT every year. NGOs like BRAC, ASA and Mukti provide loan services for supporting local people with an interest rate of 20%. People accorded their mixed reaction over the loan-providing services, one saying:

> *"As much as these loans compensate us during our tough times, sometimes having to pay the interest makes these loan services feel like a burden on our shoulders."*

5.6.3 Self-support system

Motivated by this, local people started taking similar initiatives like establishing self-funded organizations like "Khurushkul Jaliarchar Dried-fish Production Centre" where they hold discussion sessions for businessmen on the appropriate drying process of dried-fishes. Such interventions are appreciated by all the other dried-fish businessmen who weren't part of the trainee list in the governmental training.

6. KEY FINDINGS

- ✓ Although climate change affected the selected population differently and disproportionately, the vast majority expressed their concern over the changing climate which has impacted their livelihoods already and will continue to hurt them even badly in the long run.
- ✓ The climate change adaptation measures and initiative taken so far by the government and non-government organizations is extremely limited by all standards.
- ✓ Lack of livelihood protection, livelihood promotion, livelihood diversification and livelihood transformation interventions are almost absent or very less.
- ✓ The recognized climate refugees are in a transition phase due to their migration within a gated community that has resulted in a substantial loss of income opportunities.
- ✓ The impact of such migration is more vivid on women who have been forced to take up jobs that require extensive physical labor. Most of the women do not have an income source that burdens them with further dependency on their male counterpart.
- ✓ The Rakhine community lacks capital and has experienced different disasters in the past which has significantly limited their fishing business. Due to the lack of capital, production of Nappi has also been taken up by their fellow Muslim community members. Although, this ethnic group and other ethnic groups are the major consumers of customer of this locally produced delicacy, they are not the owners of such business anymore. The community requires support from government and non-government organizations.
- ✓ The study population benefits from extracting natural resources mostly and they are very unaware of the impact of their actions on natural ecosystem which depleted the natural resource base to a great extent. Overextraction has also caused extinction of many species. A shift from the traditional practice at this point is absolutely necessary.
- ✓ A lack of social cohesion between climate migrants and the local community as well as Rakhine and Muslim community was felt. Political representatives must address these issues immediately.
- ✓ Climate adaptive livelihood options must be made a top priority of all the existing and future climate change responsive programs in that area.

7. RECOMMENDATIONS AND CONCLUSION

7.1 Recommendations

The recommendations of the study are based on the opinions of the community people and key informant interviewers. They are as followings –

1. Government and non-government organizations should invest more in climate adaptation and mitigation strategies in the area and adopt an "innovative approach" catered towards the most vulnerable communities.
2. A range of training programs with a special focus on women and other socially excluded groups i.e., ethnic minority, persons with disability should be carried out. The training programs may include following trainings –
    a. Training on preparing handicraft (for women)
    b. Training on boutique (for women)
    c. Training on parlour skills (for women)
    d. Training on tourism and hospitality management (for both men and women).
    e. Training on tailoring (for women)
    f. Training on ICT i.e., mobile repair (for both women and men)
    g. Training on livestock rearing (for both women and men)
3. Interventions such as small business support or monitored cash grant for predefined support (buying autorickshaw/CNG) will also be helpful.
4. The interventions must work on all fronts of resilient livelihood. Specific actions include –
    a. Livelihood Protection – Establishing dams/polders to protect against the sudden surge of water in selected places.
    b. Livelihood Promotion – Cutting the middleman off by linking the producer with the distribution directly or helping them open their own distribution house.
    c. Livelihood Diversification – Diversifying livelihood opportunities through training.
    d. Livelihood Transformation – Transforming the livelihood practices of certain communities through imparting skills and training.
5. Access to soft loans or easy loans disbursed through government agencies in a systematic manner can also lessen the burden of interests payable to the micro-finance agencies by the poor communities.
6. There is an unexplored possibility of private sector engagement in climate change adaption where the big corporations of this area support the most vulnerable groups through their CSR and undertaking training programs to employ people from the poorer community. The modality of the program can be both short-term and long-term.
7. All the anti-environment activities i.e., deforestation and hill cutting must be stopped through executing legal and regulatory frameworks and a continuous attempt of advocacy with the policy makers must be carried out to obtain political commitment.
8. All the relevant stakeholders must be sensitized about the climate crisis and equitable climate responsive measures for including this agenda of climate change in their routine and special interventions.
9. The possibility of undertaking climate friendly initiatives even within an already planned intervention must be revisited. (For example – If an organization wants to set up a distribution/sell centre and showroom for the products made by women climate refugee or any ethnic group, the energy source for those centres should focus on renewable sources more.

10. Enhanced coordination among GOs and NGOs with a focus on implementing outcome-based interventions/joint interventions.

7.2 Conclusions

In conclusion, this study has shed light on the profound impacts of climate change on vulnerable coastal communities (i.e., climate refugee resettling communities in and the Rakhine ethnic minority) in the Khuruskul and Chowfaldandi areas of Cox's Bazar, Bangladesh. The findings have highlighted the disproportionate and differential effects of climate change, particularly on the fishing community, women, people with disabilities, and ethnic minorities. The increasing frequency and intensity of climate-related disasters have disrupted livelihoods and exacerbated vulnerabilities in these communities.The study has identified key adaptation strategies and opportunities for enhancing the adaptive capacity and resilience of coastal communities. Climate-resilient agriculture practices, diversification of income sources, and promotion of alternative livelihood options emerged as important approaches to build resilience. Additionally, capacity-building programs focused on skill development, entrepreneurship, and inclusion were found to be crucial for creating sustainable livelihood opportunities and reducing vulnerability.

Based on the findings, several recommendations have been proposed. These include strengthening climate change adaptation measures with targeted investments and infrastructure improvements, protecting and promoting existing livelihoods, enhancing skills and capacity through training programs, fostering social cohesion and community integration, and advocating for supportive policies at the governmental level.

It is imperative that urgent action is taken to address the challenges posed by climate change in the coastal region of Bangladesh. The successful implementation of the recommended measures will contribute to the resilience and sustainable development of vulnerable communities, ensuring their ability to cope with and adapt to the changing climate. Collaboration among government agencies, non-governmental organizations, and local communities is essential for achieving these goals and securing a better future for coastal populations in Bangladesh. By prioritizing climate change adaptation and resilience-building efforts, we can pave the way for a more sustainable and resilient future for all.

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ANNEXURES

Annex I: All Tables From the Findings

B. Socio Demographic Characteristics

SL	Question	Frequency	Percent
01	**Current age (in years)**	(N = 210)	
	<18 years	3	1.43
	18-40 years	119	56.67
	41-60 years	76	36.19
	>60 years	12	5.71
02	**Biological identity**	(N = 210)	
	Male	158	73
	Female	52	27
	Third Gender	00	00
03	**Marital Status**	(N = 210)	
	Single	55	26.19
	Married	138	65.71
	Separated	00	00
	Widowed	17	8.10
	Divorced	00	00
04	**Educational qualification**	(N = 210)	
	Can't sign	17	8.10
	Sign only	39	18.56
	Primary	94	44.76
	SSC	37	17.62
	HSC	22	10.48
	Undergraduate/Graduate	1	.48
05	**Occupation**	(N = 210)	
	Farmer	19	9.05
	Fisherman	26	12.38
	Day laborer	46	21.90
	Small business	6	2.86
	Salt business	10	4.76
	Housewife	51	24.29

SL	Question	Frequency	Percent
	Affiliated with tourism	10	4.76
	Govt. job	4	1.90
	Unemployed	3	1.43
06	**Do you consider yourself as ethnic minority?**	(N = 210)	
	Yes	53	25.24
	No	157	74.76
	No comment	00	00
07	**If yes, what is your ethnic minority?**	(N = 53)	
	Rakhine	53	100
	Bengali	00	00
	Rohingya	00	00

C. Socio-economic Condition

SL	Question	Frequency	Percent
01	**What is your monthly family income?**	(N = 210)	
	<5000	76	36.19
	5001-15000	97	46.19
	15001-25000	34	16.19
	>25000	3	1.43
02	**Total number of persons living in household?**	(N = 210)	
	1-3 persons	41	19.52
	4-7 persons	124	59.05
	>7 persons	45	21.43
03	**What kind of land are you living in?**	(N = 210)	
	Own	95	45.24
	Government (khash land)	90	42.86
	Leased property	25	11.90
04	**How is your housing condition?**	(N = 210)	
	Kutcha	88	41.90
	Semi-pucca	25	11.91
	Pucca	97	46.19
05	**Do you have access to safe drinking water?**	(N = 210)	
	Yes	187	89.05

SL	Question	Frequency	Percent
	No	23	10.95
06	**What is your main source of drinking water?**	(N = 210)	
	Piped-water supply	30	14.28
	Tube well	158	75.24
	Others	22	10.48
07	**What is the minimum age of marriage for female members in your household?**	(N = 210)	
	>18 years	44	20.95
	19-25 years	157	74.76
	>25 years	9	4.29
08	**Have you or anyone in your family been involved in giving or receiving dowry?**	(N = 210)	
	Yes	202	96.19
	No	2	0.95
	No comment	6	2.86

Section 2: Disaster Related Information

SL	Question	Frequency	Percent
01	**What are the commonly faced disasters in your area?**	(N = 210)	
	Cyclone	197	93.81
	Storm Surge	172	81.90
	Coastal Flooding	139	66.19
	Salinity Intrusion	60	28.57
	Drought	33	15.71
	Water Scarcity	91	43.33
02	**Have you or your family been affected by disasters in the last 5 years?**	(N = 210)	
	Yes	27	12.86
	No	149	70.95
	Don’t know	34	16.19
03	**What sectors of your life got mostly affected by disasters?**	(N = 27)	
	Livelihood	27	100

SL	Question	Frequency	Percent
	Residence	27	100
	Education	12	44.44
	Transportation	18	66.67
	Food	25	92.59
	Health	6	22.22
04	**Have you or your family ever been displaced as a result of disasters?**	(N = 210)	
	Yes	106	50.48
	No	87	41.43
	Don't know	17	8.09
05	**Did you receive early warnings before a disaster in the last 5 years?**	(N = 210)	
	Yes	198	94.29
	No	10	4.76
	Don't know	2	0.95
06	**What are the sources of early warning?**	(N = 210)	
	CPP	190	9.05
	UDMC	173	82.38
	Television	56	26.67
	Radio	34	16.19
	Neighbors	39	18.57
	Others	14	6.67
07	**Did your family use cyclone shelters in the past**	(N = 210)	
	5 years?		
	Yes	34	16.19
	No	161	76.66
	Don't know	15	7.15
08	**Have you received any training regarding disaster risk reduction?**	(N = 210)	
	Yes	0	0
	No	186	88.57
	Don't know	24	11.43

Section 3: Climate Change & Its Impacts

SL	Question	Frequency	Percent
01	**Are you familiar with the term "climate change"**	(N = 210)	
	Yes	127	60.48
	No	44	20.95
	Don't know	39	18.57
02	**Have you observed any changes in the frequency/intensity of disasters in your area in last 5 years?**	(N = 210)	
	Yes	64	30.48
	No	115	54.76
	Don't know	31	14.76
03	**Has the temperature of your area changed in the last 5 years?**	(N = 210)	
	No change	07	3.33
	Little	26	12.39
	Medium	24	11.43
	High	109	51.90
	Very high	44	20.95
04	**Has the rainfall pattern of your area changed in the last 5 years?**	(N = 210)	
	No change	10	4.76
	Little	19	9.05
	Medium	27	12.86
	High	112	53.33
	Very high	42	20
05	**Have you observed any change in the sea level rise in the past 5 years?**		
	No change	10	4.76
	Little	19	9.05
	Medium	27	12.86
	High	112	53.33
	Very high	42	20

SL	Question	Frequency	Percent
05	**Has the intensity of winter season changed in your area for the past 5 years?**	(N = 210)	
	No change	10	4.76
	Little	19	9.05
	Medium	27	12.86
	High	112	53.33
	Very high	42	20
06	**Did the changing climate/weather pattern impact your livelihood?**	(N = 210)	
	Yes	179	85.24
	No	24	11.43
	Don't know	7	3.33
07	**Are you aware of the reasons behind climate change?**	(N = 210)	
	Yes	42	20
	No	123	58.57
	Don't know	45	21.43
08	**Are you concerned regarding individual action on climate change (reducing carbon footprint, using green technologies etc.)**	(N = 210)	
	Yes	11	5.24
	No	137	65.24
	Don't know	62	29.52
08	**What sectors are mostly affected due to the changing climate/weather patterns?**	(N = 210)	
	Livelihood	174	82.86
	Education	67	31.90
	Residence	165	78.57
	Physical health	47	22.38
	Mental health	21	10
	Transportation	49	23.33
	No impacts	3	1.43
	Others	12	5.71

SL	Question	Frequency	Percent
09	**Have you ever received any training to adapt the adverse impacts of climate change?**	(N = 210)	
	Yes	00	0
	No	191	90.95
	Don't know	19	9.05
10	**If not, are you interested in receiving such training??**	(N = 210)	
	Yes	165	78.57
	No	18	8.57
	Don't know	27	12.86

Section 4: Agricultural Practices, livelihood & adaptation measures

SL	Question	Frequency	Percent
01	**Is agriculture/farming your main/secondary source of income?**	(N = 210)	
	Yes	19	9.05
	No	191	90.95
	Don't Know		
02	**What is the ownership status of the land that you use for cultivating crops?**	(N = 19)	
	Owned	7	36.84
	Sharecrop	4	21.05
	Leased	8	42.11
03	**What crops do you grow?**	(N = 19)	
	Rice	11	57.89
	Vegetables	8	42.11
04	**Have you observed any change in yield in the last 5 years?**	(N = 19)	
	No change	4	21.05
	Significant decrease in yield	8	42.11
	Significant increase in yield	1	5.26
	Don't know	6	31.58

SL	Question	Frequency	Percent
05	**Have you observed any change in agricultural patterns in the last 5 years?**	(N = 19)	
	No Change	6	31.58
	Little	5	26.32
	Medium	4	21.05
	High	4	21.05
	Very High	0	0
06	**What is your primary/secondary source of income (If not agriculture)?**	(N = 191)	
	Fisherman	26	13.60
	Day Laborer	46	24.08
	Small Business	6	3.14
	Salt business	10	5.24
	Rickshaw Puller	0	0
	Housewife	51	26.70
	Nappi	25	13.09
	Govt. Job	4	2.09
	Unemployed	3	1.58
	Boatman	10	5.24
	Affiliated with Tourism (Hotel boy, Waiters etc.)	10	5.24
07	**Has your livelihood been affected by climate change?**	(N = 210)	
	Yes	184	87.62
	No	26	12.38
08	**(If livelihood affected by CC) What adaptation strategies have you employed?**	(N=210)	
	Crop Diversification	21	10
	Livelihood Transformation	128	60.95
	Relocation	97	46.19
	Changing the timing of planting	21	10
	Support from family and friends	29	13.81
	Others (Specify)	12	5.71

SL	Question	Frequency	Percent
05	**Have you observed any change in agricultural patterns in the last 5 years?**	(N = 19)	
	No Change	6	31.58
	Little	5	26.32
	Medium	4	21.05
	High	4	21.05
	Very High	0	0
09	**Have you heard of any climate resilient crops?**		
	Yes	22	10.48
	No	188	89.52
	Don't Know		
10	**Have you ever received any training regarding livelihood measures?**		
	Yes	45	21.43
	No	165	78.57
11	**What livelihood option do you usually pursue during the lean period?**		
	Day Laborer	35	35
	Unemployed	65	65
12	**What can be arranged for the fishermen community to ensure a reliable and constant IGA during lean period?**		
	Skill Enhancement training	108	51.43
	Loan for small business	88	41.90
	Involve in any income generating activities	14	6.67

Community	Occupation before 1991 cyclone			Occupation after 1991 cyclone (Present Occupation)		
	Occupation	Frequency (n)	Percentage (%)	Occupation	Frequency (n)	Percentage (%)
Climate Refugee (90)	Fisherman	31	34.44	Fisherman	13	14.44
	Day Laborer	7	7.77	Day Laborer	24	26.66
	Small Business	2	2.22	Small Business	0	0
	Salt business	0	0	Salt business	0	0
	Housewife	31	34.44	Housewife	30	33.33
	Govt. Job	0	0	Govt. Job	4	4.44
	Unemployed	0	0	Unemployed	0	0
	Boatman	10	11.11	Boatman	7	7.77
	Farmer	9	10	Farmer	7	7.77
	Affiliated with Tourism (Hotel boy, Waiters etc.)	0	0	Affiliated with Tourism (Hotel boy, Waiters etc.)	5	5.55
	Nappi	0	0	Nappi	0	0
Chawfaldaundi Muslim Community (67)	Fisherman	29	43.28	Fisherman	4	5.97
	Day Laborer	6	8.95	Day Laborer	16	23.88
	Small Business	1	1.49	Small Business	1	1.49
	Salt business	0	0	Salt business	2	2.98
	Housewife	19	28.35	Housewife	17	25.37
	Govt. Job	0	0	Govt. Job	0	0
	Unemployed	0	0	Unemployed	0	0
	Boatman	0	0	Boatman	0	0
	Farmer	12	17.91	Farmer	12	17.91
	Affiliated with Tourism (Hotel boy, Waiters etc.)	0	0	Affiliated with Tourism (Hotel boy, Waiters etc.)	2	2.98
	Nappi	0	0	Nappi	13	19.40
Rakhine Community (53)	Fisherman	28	52.83	Fisherman	9	16.98
	Day Laborer	5	9.43	Day Laborer	6	11.32
	Small Business	1	1.88	Small Business	5	9.43
	Salt business	0	0	Salt business	8	15.09
	Housewife	5	9.43	Housewife	4	7.54
	Govt. Job	0	0	Govt. Job	0	0
	Unemployed	0	0	Unemployed	3	5.66
	Boatman	9	16.98	Boatman	3	5.66

Community	Occupation before 1991 cyclone			Occupation after 1991 cyclone (Present Occupation)		
	Occupation	Frequency (n)	Percentage (%)	Occupation	Frequency (n)	Percentage (%)
	Farmer	5	9.43	Farmer	0	0
	Affiliated with Tourism (Hotel boy, Waiters etc.)	0	0	Affiliated with Tourism (Hotel boy, Waiters etc.)	3	5.66
	Nappi	0	0	Nappi	12	22.64

Section 5: Status of Social Inclusion

SL	Question	Frequency	Percent
01	**Have you ever felt excluded in your community?**	(N = 210)	
	Yes	121	57.62
	No	54	25.71
	Don't know	35	16.67
02	**Do you value the female/PWD/ethnic minority member's opinion in your house?**	(N = 210)	
	Yes	87	41.43
	No	110	52.38
	Don't know	13	6.19
03	**Are the female members in your household allowed to work outside of the house when the active primary source of income gets affected due to a disaster/**	(N = 210)	
	Yes	47	22.38
	No	135	64.29
	No comment	28	13.33
04	**Do you think that your neighbors will help you in the emergence of a disaster?**	(N = 210)	
	Yes	139	66.19
	No	32	15.24
	Don't know	39	18.57
05	**What disability inclusive features are available in the critical infrastructures?**	(N = 210)	
	Ramp	63	30
	Disability-Inclusive Washroom	08	3.81

SL	Question	Frequency	Percent
	Instructions in Braille	00	0
	Volunteers to communicate in sign language	05	2.39
	Not available at all	101	48.09
	Don't know	33	15.71

Section 6: Internal and External Support System

SL	Question	Frequency	Percent
01	**Are you a member of any local/ community-based organization?**	(N = 210)	
	Yes	78	37.14
	No	132	62.86
02	**If yes, how would you describe the organization?**		
	Financial	12	15.39
	Social	45	57.69
	Humanitarian	00	0
	Political	00	0
	Labor Union	21	26.92
03	**Do you think forming groups/self-help groups will be beneficial for you?**	(N = 210)	
	Yes	117	55.71
	No	54	25.71
	Don't know	39	18.58
04	**Do you have any indigenous knowledge or resources that help you tackle the adverse impacts of climate change/disaster?**	(N = 210)	
	Yes	19	9.05
	No	77	36.66
	Don't know	82	39.05
	No response	32	15.24
05	**Have you ever been a beneficiary of the social safety net programs?**	(N = 210)	
	Yes	59	28.09
	No	132	62.86
	Don't know	19	9.05

SL	Question	Frequency	Percent
06	**Are you aware of the government services that you are entitled to?**	(N = 210)	
	Yes	46	21.90
	No	142	67.62
	Don't know	22	10.48
07	**If yes, have you ever availed any of those services?**	(N = 46)	
	IGA Training	9	19.56
	SSN Programs	25	54.35
	Subsidized Agricultural Equipment etc.	4	8.70
	Others	8	17.39
08	**Have you received any humanitarian support from government agencies?**	(N = 210)	
	Yes	44	20.96
	No	151	71.90
	Don't know	15	7.14
09	**Have you received any humanitarian support from non-government agencies?**	(N = 210)	
	Yes	20	9.52
	No	166	79.05
	Don't know	24	11.43

Annex 2: Quantitative Survey Questionnaire

Climate Change and Livelihood Adaptation for Coastal Based Community People

Section 1: Demographic Profile

Sl	Questionnaire/ Statements	Coding categories	Code	Definition Key notes
A. Identification				
A.	Village			
B	Union			
C	Upazila			
D	Name of the respondent			
E	Mobile number (Own/family members)			
B. Socio demographic characteristics				
1	Current Age (In years)	1 = >18 Years		
		2 = 18-40 Years		
		3 = 40-60 Years		
		4 = <60 Years		
2	Biological identity	1 = Male		
		2 = Female		
		3 = Third Gender		
		4= Prefer not to disclose		
		5= Others (Please specify)		
3	Marital status	1 = Married		
		2 = Single		
		3 = Separated		
		4 = Widowed		
		5= Divorced		
4	Educational qualification	1 = Can't sign		
		2 = Can sign only		
		3 = Pre-primary		
		4 = Primary passed		
		5 = JSC passed		
		6 = SSC passed		
		7 = Graduate/ Post graduate		
		8 = Madrasa		
		9 = Others (Specify)		

Sl	Questionnaire/ Statements	Coding categories	Code	Definition Key notes
5	Occupation	1 = Farmer		
		2 = Fisherman		
		3 = Day Labourer		
		4 = Small Business		
		5 = Student		
		6 = Rickshaw Puller		
		7 = Autorickshaw driver		
		8 = Housewife		
		9 = Teacher		
		10 = Govt. Job		
		11 = Unemployed		
		12 = Boatman		
		13= Affiliated with Tourism (Hotel boy, Waiter etc.)		
		14 = Other (Specify)		
6	Have you ever been displaced from your home due to climate-related events, such as flooding or cyclones?	1 = Yes		
		2 = No		
7	Do you consider yourself as an ethnic minority?	1 = Yes		
		2 = No		
8	If yes, what is your ethnic identity?	1 = Bengali		
		2 = Rohingya		
		3 = Chakma		
		4 = Marma		
		5 =Others (Specify)		
C. Socio-economic Condition				
9	What is your monthly family income?	1 = <5000 BDT		
		2=5001-15000 BDT		
		3=15001-25000 BDT		
		4 = > 25000 BDT		
		5= >25000 BDT		
10	Total number of persons living in your household	**Different category**	**Number**	**Occupation**
		1.Children (under 5 years)		
		2.Children (6-18)		
		3.Adult (18-59)		
		4.Older People		

Sl	Questionnaire/ Statements	Coding categories	Code	Definition Key notes
11	How is your housing condition?	1 = Kutcha		
		2 = Semi-pucca		
		3 = Pucca		
11	What kind of land are you living in?	1 = Own		
		2= Rented		
		3= Government (Khas) land		
		4 = Leased Property		
		5 = Others		
12	Do you have access to safe drinking water?	1 = Yes		
		2 = No		
13	What is your main source of drinking water? (Multiple Answers)	1 = Piped-water supply		
		2 = Tube well		
		3 = Pumped Water		
		4 = Pond Water		
		5 = Others		
14	What is the minimum age of marriage for female members in your household?	1 = <18 years		
		2 = 19-25 years		
		3 = >25 years		
15	Have you or anyone in your family been involved in giving or receiving dowry?	1 = Yes		
		2 = No		

Section 2: Disaster Related Information

16	What are the commonly faced disasters in your area?	1) Cyclone 2) Storm Surge 3) Coastal Flooding 4) Salinity Intrusion 5) Drought 6) Water Scarcity 7) Land slide 8) Other (specify)
17	Have you or your family been affected by disasters in the last 5 years?	1) Yes 2) No 3) Don't Know 4) No Response
18	If yes, what sectors of your life got mostly affected by disasters?	1) Livelihood 2) Residence 3) Education 4) Health 5) Transportation 6) Food 7) Others_____

19	Have you or your family ever been displaced as a result of disasters?	1) Yes 2) No 3) Don't Know 4) No Response
20	If yes, where did you shift?	1) Within Cox's Bazar 2) Outside of Cox's Bazar 3) Others (Specify)
21	Did you receive early warnings before a disaster in the last 5 years?	5) Yes 6) No 7) Don't Know 8) No Response
22	If yes, what was the source of early warning?	1) CPP 2) UDMC 3) Television 4) Radio 5) Neighbor 6) Others _____
23	Do you use any indigenous early warning methods/ techniques?	9) Yes 10) No 11) Don't Know 12) No Response
24	If yes, what are the methods/techniques? (List)	9) Yes 10) No 11) Don't Know 12) No Response
25	Did you or your family use cyclone shelters in the past 5 years?	1) Yes 2) No 3) Don't Know 4) No Response
26	Have you received any training regarding disaster risk reduction?	1) Yes 2) No 3) Don't Know 4) No Response
27	If no, are you interested in receiving such training?	1) Yes 2) No 3) Don't Know 4) No Response

Section 3: Climate Change and Its Impacts

28	Are you familiar with the term "Climate Change"?	1) Yes 2) No 3) Don't Know 4) No Response				
29	Have you observed any change in the frequency/intensity of disasters in your area in the last 5 years?	1) Yes 2) No 3) Don't Know 4) No Response				
		No Change	Little	Medium	High	Very High
30	Has the temperature of your area increased in the last 5 years?					
31	Has the rainfall pattern in your area changed in the last 5 years?					
32	Have you observed any change (sea level rise) in the sea level in the previous 5 years?					
33	Has the intensity of the winter season changed in your area in the last 5 years?					
34	Did the changing climate/weather impact your livelihood?	1) Yes 2) No 3) Don't Know 4) No Response				
35	Are you aware of the reasons behind climate change?	1) Yes 2) No 3) Don't Know 4) No Response				
36	Are you concerned regarding individual action on climate change (reducing carbon footprint, using green technologies)?	1) Yes 2) No 3) Don't Know 4) No Response				
37	What sectors are mostly affected due to the changing climate/weather patterns?	1) Education 2) Food 3) Residence 4) Livelihood 5) Transportation 6) Physical health 7) Mental health 8) No Impacts 9) Others (please specify)				

38	Have you received any training to adapt to the adverse impacts of climate change?	1) Yes 2) No 3) Don't Know 4) No Response
39	If not, are you interested in receiving such training?	1) Yes 2) No 3) Don't Know 4) No Response

Section 4: Agricultural Practices, livelihood, and adaptation measures

40	Is agriculture/farming your main/secondary source of income? (If no, skip to	1) Yes 2) No 3) Don't Know 4) No Response
41	How much land do you use for cultivating crops?	
42	What is the ownership status of the land that you use for cultivating crops?	1) Owned 2) Sharecrop 3) Leased 4) Government (Khas) 5) Others (Specify)
43	How many crops do you cultivate yearly?	1) 3 2) 2 3) 1
44	What crops do you grow? (Multiple Answers)	1) Rice 2) Maize 3) Vegetables 4) Wheat 5) Fruits 6) Cash Crops 7) Other (please specify) _____
45	Have you observed any change in yield in the last 5 years?	1) No Change 2) Significant decrease in yield 3) Significant increase in yield 4) Don't know
46	(If decrease) Do you wish to maintain agriculture farming despite a decrease in yield?	1) Yes 2) No 3) Don't Know 4) No Response
47	Have you observed any change in agricultural patterns in the last 5 years?	1) No Change 2) Little 3) Medium 4) High 5) Very High

48	What is your primary/secondary source of income (other than agriculture)?	1 = Fisherman 2 = Day Labourer 3 = Small Business 4 = Student 5 = Rickshaw Puller 6 = Housewife 7 = Teacher 8 = Govt. Job 9 = Unemployed 10 = Boatman 11= Affiliated with Tourism (Hotel boy, Waiter etc.) 12 = Other (Specify)
49	Has your livelihood been affected by climate change?	1) Yes 2) No 3) Don't Know 4) No Response
50	(If livelihood affected by CC) What adaptation strategies have you employed?	1) Crop diversification 2) livelihood transformation 3) relocation 4) changing the timing of planting 5) support from family and friends 6) Others (Specify)
51	Have you heard of any climate resilient crops?	1) Yes 2) No 3) Don't Know 4) No Response
52	If yes, have you ever cultivated any?	1) Yes 2) No 3) Don't Know 4) No Response
53	If you have an option to change your current occupation, what other livelihood option would you opt for? (List all)	1) 2)
54	Have you ever received any training regarding livelihood measures/IGA?	1) Yes 2) No 3) Don't Know 4) No Response
55	Will be you be interested in attending trainings/workshops regarding IGA?	1) Yes 2) No 3) Don't know
56	(If fisherman) what livelihood option do you usually pursue during the lean period?	1) Agriculture farming 2) SSN 3) Beach Hawking 4) Auto Driving 5) Dry fish business 6) Others

57	What can be done/arranged for the fishermen community to ensure a reliable and constant IGA during the lean period?	1) Skill Enhancement Training 2) Loan for Small Business 3) Involve in any income generating activity 4) Do Nothing 5) Others (Specify)

Section 5: Status of Social Inclusion

58	Have you ever felt excluded in your community?	1) Yes 2) No 3) Don't Know 4) No Response
59	If yes, what is the reason behind it?	1) Being Ethnic minority 2) Being poor 3) Being the victim of social taboos 4) For being treated as an outsider 5) Others (please specify)
60	Does your opinion get valued in your family?	1) Yes 2) No 3) No Comments 4) Don't know
61	If not, what is the reason behind it?	1) Because I am a woman 2) Because I don't earn 3) Others (please specify)
62	Do you value the female/PWD/ethnic minority member's opinion in your house?	1. Yes 2. No 3. Not applicable
63	If you own/ed a land/house, will you/did you share the ownership with your wife/daughter?	1. Yes 2. No 3. Not applicable
64	Are the female members in your household allowed to work outside of the house when the active primary source of income gets affected due to a disaster?	1) Yes 2) No 3) No comment 4) Not applicable
65	Do the women, PWD and ethnic group of people get represented during any decision making?	1) Yes 2) No 3) Don't Know 4) No Response
66	Do women, PWD and ethnic group of people have equal access to the natural resources (entitlement to pondwater, crops, tube well) in your area?	1) Yes 2) No 3) Don't Know 4) No Response
67	Do you think that your neighbours will help you in the emergence of a disaster? (How is your relationship with them?)	1) Yes 2) No 3) Don't Know 4) No Response

68	What disability-inclusive features are available in the critical infrastructures (hospital, school, shelters etc.) in your area?	1) Ramp 2) Disability-inclusive washroom 3) Instructions in braille 4) Volunteers to communicate in sign language 5) Not Available at all 6) Others (Specify)
69	In your opinion, what are the other vulnerabilities females in this area face in general?	1) Gender based violence (GVB) 2) Lack of work opportunities 3) Lack of WASH facilities 4) Lack of Healthcare 5) Others (please specify)
70	In your opinion, what are the vulnerabilities Persons with Disabilities (PWD) in this area face in general?	1) Lack of WASH facilities 2) Lack of healthcare 3) Lack of movement facilities 4) Social barriers 5) Others (please specify)
71	In your opinion, what are the vulnerabilities ethnic groups in this area face in general?	1) Lack of WASH facilities 2) Lack of healthcare 3) Lack of work opportunities 4) Reduced food intake 5) Social Exclusion 6) Others (please specify)

Section 6: Internal/External Support System

72	Are you a member of any local/community-based organization?	1) Yes 2) No
73	If yes, how would you describe the organization?	1) Financial 2) Social 3) Humanitarian 4) Political 5) Labor Union 6) Men's/Women's
74	If not, do you think forming groups/self help groups will be beneficial for you?	1) Yes 2) No 3) Don't Know 4) No Response
75	Do you have any indigenous knowledge or resources that help you tackle the adverse impacts of climate change/disaster?	1) Yes 2) No 3) Don't Know 4) No Response
76	If yes, what are those? (List all)	
77	Have you ever been a beneficiary of any of the social safety net programs?	1) Yes 2) No 3) Don't Know 4) No Response

Section 6: Internal/External Support System

78	If yes, which program(s)? [Multiple Response]	1) Test Relief 2) KABITA 3) EGPP 4) VGD 5) VGF 6) Disability Allowance 7) Widow Allowance 8) Others(_____)
79	Are you aware of the government services that you are entitled to?	1) Yes 2) No 3) Don't Know 4) No Response
80	If yes, have your ever availed any of those services?	1) Yes 2) No 3) Don't Know 4) No Response
81	If yes, what type of services have you availed?	1) IGA Training 2) SSN Programs 3) Subsidized agricultural equipment etc. 4) Others (Specify)
82	Have you received any humanitarian support from government agencies? (Local DM committee, UNO office etc.)	1) Yes 2) No 3) Don't Know 4) During Covid Only 5) No Response
83	If yes, what type of support have you received?	1) Cash support 2) Relief Items 3) IGA Training 4) Awareness Raising/ Preparedness 5) Others (Specify)_____
83	Have you received any humanitarian support from the non-government agencies?	1) Yes 2) No 3) Don't Know 4) No Response
84	If yes, what type of support have you received?	1) Cash support 2) Relief Items 3) IGA Training 4) Awareness Raising/ Preparedness 5) Others (Specify)_____

Section 7: Recommendation

85	Who do you think should play the leading role in advancing the lifestyles of climate-vulnerable people?	1) Government 2) NGOs 3) Private sectors 4) Political leaders 5) Others

86	What are some of the critical interventions that you need in this area to adapt with the changing climate? (List in order of priority)	
87	What are some of the interventions that can be undertaken to aware local people about livelihood adaptation associated with climate change? (List in order of priority)	
88	How can you play a major role in adapting with the adverse impacts of climate change?	

Annex 3: Qualitative Checklists

FGD and IDI Checklist

Climate Change and Livelihood Adaptation for Coastal Based Community People

1. **Demographic Information–** (What is the educational status of the people in general in the study area? Are there any ethnic groups or socially excluded groups who live in that area?)

2. **Socio-Economic Conditions–** (What is the economic condition of the people in general? Do people have access to basic rights? Does social cohesion exist among the community members? Are people affected by any social malpractices i.e., dowry, early marriage etc.)

3. **Disaster Related Information–** (What types of disaster do the community people experience mostly? What are the other risks that the communities are susceptible to but haven't experienced i.e., earthquake? How do they respond to disasters? How prepared are they? What role does the local disaster management committee/local administration play for supporting them? Do they receive early warning signals? Do they rely on indigenous knowledge?

4. **Climate Change and its Impact-** (How well are they informed about the adverse impacts of climate change? What are the different impacts of climate change on the community i.e., health, livelihood etc.? How do they cope/adapt with the changes?)

5. **Livelihood and Adaptation Measures–** (What are the community's main livelihood options? How has climate change threatened their livelihood options specially agriculture? Do they know about climate resilient agricultural practices? If yes, how do they know and how is that put into practice? What are the existing alternative livelihood measures? What do fishermen do during their lean period? Are they enthusiastic about entrepreneurship? What are the main challenges for becoming an entrepreneur? Do they serve the local tourism industry? How can their livelihood options be made more sustainable?

6. **Internal and External Support System–** (Are there any internal support systems that are of assistance to them to combat adverse impacts of climate change and their routine sufferings? If yes, what resources do they have? Do they receive support from GO and NGOs? If yes, how adequate is the support? What type of support is being provided at the moment? What are the different types of institutions they can access for receiving services at low cost or no cost?

7. **Recommendations–** (What are the three main priorities of the community people at the moment? What can be done within the existing framework to support them? Which interventions are necessary? Which stakeholders can play a vital role in supporting them? What might be the future challenges in implementing those actions?)

FGD Information Table

Focus Group Discussion (Primary Information)									
Date:					Time:				
District:					Upazilla:				
Union/Ward:					Village:				
Sl. No.	Participant's Name	Age	Specific Identify (If Applicable – PWD, Ethnic Minority etc.)	Gender	Educational Qualification	Monthly Income	Monthly Expenditure	Occupation	Socio-Economic Status (Ex- Middle Class, Lower Class etc.)
01.									
02.									
03.									
04.									
05.									
06.									
07.									
08.									
09.									
10.									

KII Checklist

1. Demographic Information:

- What is the educational status of the people in the study area?
- Are there any ethnic groups or socially excluded groups who live in that area?

2. Socio-Economic Conditions:

- What is the economic condition of the people in general?
- Do people have access to basic rights?
- Does social cohesion exist among the community members?
- Are people affected by any social malpractices (e.g., dowry, early marriage)?

3. Disaster Related Information:

- What types of disaster do the community people experience mostly?
- What are the other risks that the communities are susceptible to but haven't experienced (e.g., earthquake)?
- How do they respond to disasters? How prepared are they?
- What role does the local disaster management committee/local administration play in supporting them?
- Do they receive early warning signals? Do they rely on indigenous knowledge?
- Have you/your institution responded to any disaster event? If yes, please share details.

4. Climate Change and its Impact:

- How well are they informed about the adverse impacts of climate change?
- What are the different impacts of climate change on the community (e.g., health, livelihood)?
- How do they cope/adapt with the changes?
- Does climate change pose any threat to your operation in the area?

5. Livelihood and Adaptation Measures:

- What are the community's main livelihood options?
- How has climate change threatened their livelihood options, especially in agriculture?
- Do they know about climate resilient agricultural practices? If yes, how do they know and how is that put into practice?
- What are the existing alternative livelihood measures?
- What do fishermen do during their lean period?
- Are they enthusiastic about entrepreneurship?
- What are the main challenges for becoming an entrepreneur?
- Do they serve the local tourism industry?
- How can their livelihood options be made more sustainable?
- What adaptation measures have already been suggested/will you suggest from your end?

6. Internal and External Support System:

- Are there any internal support systems that are of assistance to them to combat adverse impacts of climate change and their routine sufferings?
- If yes, what resources do they have?
- Do they receive support from the government and NGOs? If yes, how adequate is the support?

- What type of support is being provided at the moment?
- What are the different types of institutions they can access for receiving services at low cost or no cost?
- What type of support do you provide at the moment?

7. Recommendations:

- What are the three main priorities of the community people at the moment?
- What can be done within the existing framework to support them?
- Which interventions are necessary?
- Which stakeholders can play a vital role in supporting them?
- What might be the future challenges in implementing those actions?
- What are the main challenges of you/your institution currently to support these communities?
- How can you overcome these challenges?
- Which policies can be changed/modified/designed to alleviate the sufferings of these communities?
- How can you/your institution better support these communities?

Climate Change and Livelihood Adaptation for Coastal Based Community People

FGD/IDI Checklist

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5. **Livelihood and Adaptation Measures–** (What are the community's main livelihood options? How has climate change threatened their livelihood options specially agriculture? Do they know about climate resilient agricultural practices? If yes, how do they know and how is that put into practice? What are the existing alternative livelihood measures? What do fishermen do during their lean period? Are they enthusiastic about entrepreneurship? What are the main challenges for becoming an entrepreneur? Do they serve the local tourism industry? How can

their livelihood options be made more sustainable?

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7. **Recommendations–** (What are the three main priorities of the community people at the moment? What can be done within the existing framework to support them? Which interventions are necessary? Which stakeholders can play a vital role in supporting them? What might be the future challenges in implementing those actions?)

Focus Group Discussion (Primary Information)

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