UNIVERSITY OF CAPE COAST

ASSESSING CLIMATE CHANGE COMMUNICATION IN SELECTED
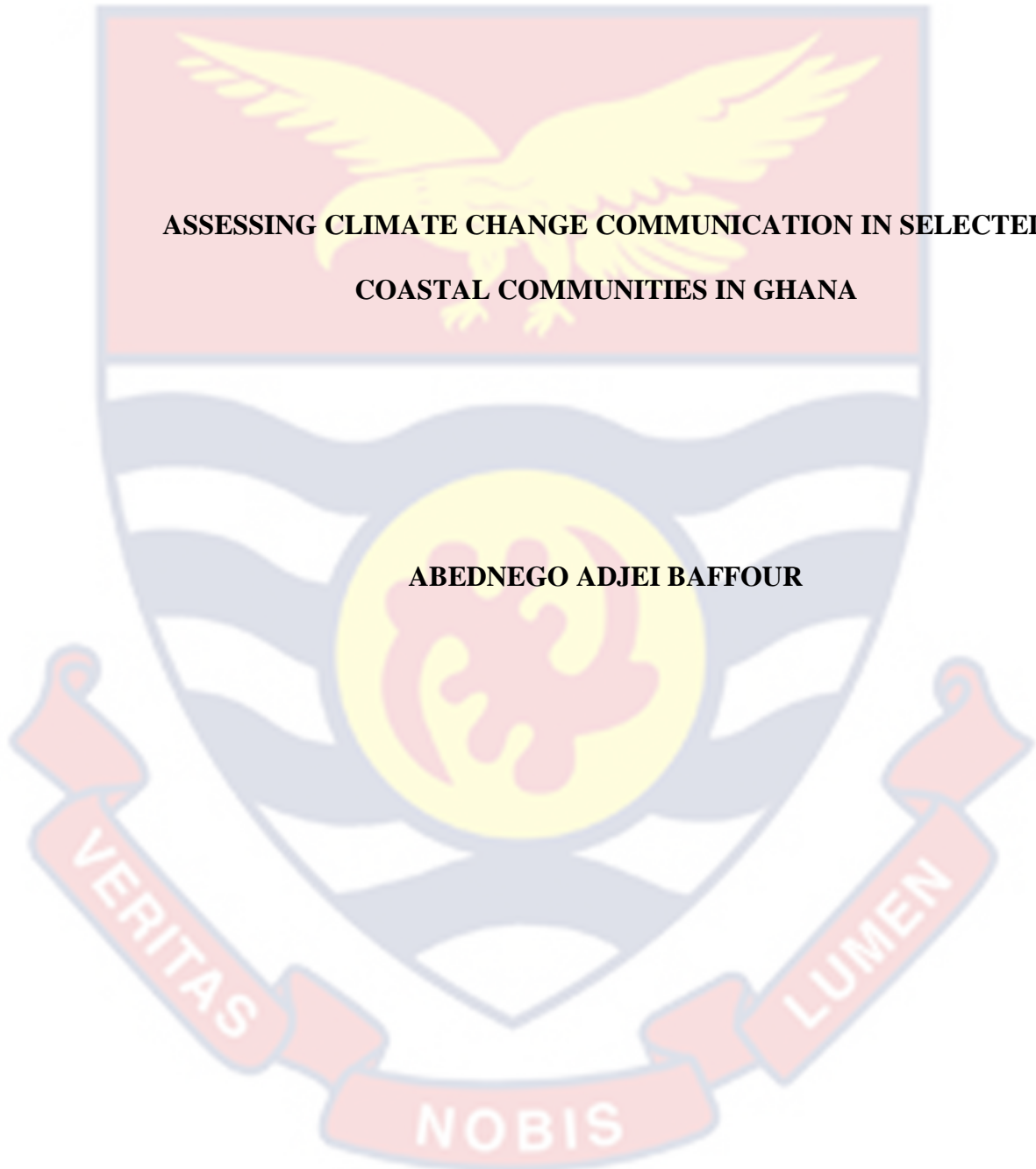
COASTAL COMMUNITIES IN GHANA

ABEDNEGO ADJEI BAFFOUR

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ASSESSING CLIMATE CHANGE COMMUNICATION IN SELECTED

COASTAL COMMUNITIES IN GHANA

BY
ABEDNEGO ADJEI BAFFOUR

A thesis submitted to the Department of Fisheries and Aquatic Sciences at the
College of Agriculture and Natural Sciences, University of Cape Coast, as part of
the requirements for obtaining a Master of Philosophy degree in Integrated
Coastal Zone Management

DECEMBER 2022

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that

no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature……………………. Date…………………………….

Name: Abednego Adjei Baffour

Supervisors' declaration

We hereby declare that the preparation and presentation of the thesis were

supervised in accordance with the guidelines on supervision of thesis laid down

by the University of Cape Coast.

Principal Supervisor's Signature………………….. Date………………………

Name: Dr. Noble Kwame Asare

Co-Supervisor's Signature………………............ Date………………………

Name: Dr. Wincharles Coker

ii

ABSTRACT

Awareness of climate change does not match the level of public engagement needed. The problem emanates from challenges that affect public comprehension of climate change. It is in furtherance to the above premise that the study sought to assess the strategies used in communicating climate change in selected communities along the coast of Ghana. The enquiry adopted the simultaneous triangulation mixed-methods which compensated for the inadequacies in quantitative and qualitative methods while leveraging on their strengths, in four selected coastal communities from the Western and Central Regions of Ghana. The findings revealed that 85% of the targeted respondents were conscious of climate change. Although 65% claimed they understood climate change, the data from the qualitative phase pointed to the contrary. In terms of perceptions, the respondents exhibited ambivalent views about the drivers and repercussions of climate change. The findings, again, uncovered that occupation and community are the most important predictors of climate change communication perception. Public understanding of climate change is impeded due to barriers encountered in the uptake of information which have resulted in limited knowledge on adaptation, little or no adaptation, destruction of properties emanating from unannounced disasters, and poor living conditions. The study also discovered more community-level strategies meant to improve future climate change communication by spurring the necessary engagement needed. The hypothesis found that religion influences one's perceptions of climate change causes, by shaping individuals' worldview, values and beliefs about the environment's origin and human responsibility. This can lead to varied perceptions, with some attributing climate change to divine will or natural cycles, while others emphasise human activities as primary drivers. Again, awareness of climate change is influenced by the community, marital status, educational level and religion. The study concluded by highlighting that there are gaps in current approaches in climate change messaging, emphasising the significance of localised messaging, community engagement, and interdisciplinary collaboration. Recommendations made include integrating indigenous knowledge, utilising multimedia platforms, and fostering partnerships for sustained impact.

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DEDICATION

I dedicate this work to my parents, Mr. Ernest Adjei Baffour and Mrs. Regina

Adjei Baffour for their encouragement and support throughout my entire studies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
UNDP	United Nations Development Programme
GEF	Global Environment Facility
FAO	Food and Agriculture Organisation
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
MoFA	Ministry of Foreign Affairs
CESPD	Centre for the Education and Study of Diverse Populations
IDM	Information Deficit Model
PoCC	Perception of Climate Change
CC	Climate Change
CCC	Climate Change Communication
AfDB	African Development Bank
UNEP	United Nations Environment Programme
CLT	Construal Level Theory
EPA	Environmental Protection Agency
MOFA	Ministry of Food and Agriculture
MMR	Mixed-Method Research
QUAN	Quantitative
QUAL	Qualitative
GSS	Ghana Statistical Service

UK   United Kingdom

NGOs   Nongovernmental Organisation

UNITAR   United Nations Institute for Training and Research

UN   United Nations

CHAPTER ONE

INTRODUCTION

Given the accelerated climate change, effective communication becomes a linchpin in facilitating adaptation, particularly in vulnerable regions like coastal Ghana. Despite efforts to disseminate information concerning climate change and its consequences, the effectiveness of communication strategies remains uncertain. Building upon prior research in climate communication, which has predominantly centred on Western contexts, this study seeks to fill a notable gap by examining the specific challenges and opportunities within the Ghanaian coastal context. This research aims to elucidate nuanced insights into effective communication pathways, tailored to local needs and preferences. Such an approach not only contributes to academic scholarship but also holds significant practical implications for policymakers, development practitioners, and community leaders engaged in climate adaptation efforts. By identifying communication barriers and best practices, this study can inform the design and implementation of targeted interventions, aimed at fostering climate resilience in Ghana and beyond.

Background to the Study

Climate change is already inexorably altering the atmosphere-ocean system (UNFCCC, 2015). The consequences are extensive and they affect the lives and livelihoods of coastal areas (California Coastal Commission, 2015) and future forecasts show a bleak picture (USAID et al., 2009; Welborn, 2018). Sea level rise which causes erosion of coastlines and damage to beach infrastructure is

one of the consequences (USAID, 2011), decline in fish resources in large lakes due to higher temperatures (UNDP & GEF, 2018; Wondimagegn & Lemma, 2016), and the emergence of vector-borne illnesses (Agbeko et al., 2018; Asekun-Olarinmoye et al., 2014; FAO, 2008) among others. Despite these implications, coordinated actions to reduce greenhouse gas (GHG) emissions have been largely ineffective (den Elzen et al., 2019; Rogelj et al., 2018). The inability of collaborative efforts to limit greenhouse gas emissions has been blamed in part on pervasive misconceptions or denial of climate change research in various nations (Hornsey et al., 2016). Because of this, the conventional fact-based technique to disseminating messages about climatic changes is not usually the most effective approach for interacting with the entire population (Badullovich et al., 2020). Over the last decade, there has been a massive surge in publications, resolving the subject of conveying climate change to non-experts publics (Ballantyne et al., 2016). Many climate change communications over the last two decades have concentrated on the problems of uncertainty, most notably whether anthropogenic actions are to blame. As a result, the focus of communication efforts has switched from telling people that global warming is occurring to taking practical actions in mitigating it (Nerlich et al., 2010).

Studies on climate change messaging and their influence on the populace have proliferated in communication and associated academic publications since the late 1990s. Notwithstanding, global and local carbon emissions continue to grow, putting humanity at risk of climate change. This raises concerns, regarding the success of existing communication efforts, as well as their listeners' ability to

2

change, as a result of these messages (Nerlich et al., 2010). There is now a single voice from the scientific community, policymakers, and the public in developing appropriate adaptation and mitigation measures to changing climatic conditions (Upadhyay & Bijalwan, 2015). Adaptation is characterised as the modification of natural or human systems to cope with current or projected environmental stressors or their impacts, to minimise damage and maximise benefits (IPCC, 2007). Mitigation strategies are efforts directed at reducing GHG emissions (Dreyfus, 2013). Adapting to the effects of global warming requires extensive knowledge, awareness and communication not only among scientists and policymakers, but also within the general public (Upadhyay & Bijalwan, 2015). Combating global warming will be effective if adaptation information is disseminated to the masses (Upadhyay & Bijalwan, 2015).

It is challenging to communicate about climate change. Climate change is viewed as a long-term, slow-moving, complicated, abstract phenomenon (Glaas et al., 2015; Somerville & Hassol, 2011; Tan et al., 2008). Another issue is widespread scientific illiteracy, which stems from people's tendency to trust and believe in individuals who hold similar social beliefs and worldviews with them. Some individuals and opinion leaders who believe that climate change is a hoax, do act as trusted messengers (Monroe et al., 2017; Somerville & Hassol, 2011). Poor framing of communication messages adversely affects public understanding (Badullovich et al., 2020; Filho, 2019; Mcgahey & Lumosi, 2018). Getting on with climate change communication to foster understanding and engagement lies in the preoccupation of communicators and messengers with choosing the right

3

words (Nerlich et al., 2010). Many words that appear entirely natural to scientists are unfathomable jargons for the rest of the world (Somerville & Hassol, 2011). Related to the choice of words and varied interpretations is the fact that global warming vocabulary is poorly understood and lacks traditional equivalents in African dialects (Burton et al., 2012; Neville & Mohammed, 2010; Ohene-Asante, 2015).

Experts worldwide share advice and the best practices on how to enhance communication. Some of these overlapping strategies include, presenting both solutions and problems, customising information to certain groups, and enticing people with stories rather than figures (Howarth et al., 2020). The use of more successful outreach techniques includes collaborating with other communicators and or messengers and interacting with publics based on shared beliefs (Somerville & Hassol, 2011). The need to utilised diverse media to communicate climate concerns has also been underscored (Yoganingrum & Hantoro, 2019). Furthermore, climate change communication must shift from a one-way information deficit model to a more dialogic and participatory approach (Nerlich et al., 2010), and scientific communication must be devoid of scientific jargons (Tan et al., 2008).

Despite some notable progress, much more work is needed to be done to better climate change communication to spur the necessary participation and public involvement (Filho, 2014). Understanding what individuals perceive of climate change may help determine the success of mass climate messaging, and training as well as the information that should be included in future

4

communications (Chadwick, 2017). Climate change communication, drawing on development journalism, should involve and encourage people to formulate climate change policies, mitigation efforts, and adaptation options (Evans et al., 2018). This necessitates the development of communication in a manner that reconciles with intended public, offers understandable information, and resolves any recognised impediments to adaptation (Glaas et al., 2015).

Problem Statement and Justification

Notwithstanding the current gains in the outcomes of African scholarly works, general knowledge in science is still weak in most regions of the continent (Karikari et al., 2016; Selormey et al., 2019), and Ghana is no exception. Again, rural families continue to act indifferently when it comes to adapting to new climate conditions (Shahid, 2012), and there is low behavioural change (Howarth et al., 2020) in response to climate change adaptation and mitigation. The problem is partly due to climate scientists, lawmakers, and practitioners failing to disseminate global warming in a manner that engages and motivates a larger population (Howarth et al., 2020), and partly due to certain barriers impeding efficient messaging for decision-making and community adaption, especially in emerging nations (Mcgahey & Lumosi, 2018). These challenges are due to the intricacies of global warming events and degree of difficulty communicating it due to complex technical terminology (Duper et al., 2019; Nerlich et al., 2010). Due to that, many individuals lack awareness of the repercussions of climate change and the urgent necessity for a solution (Khan & Nawaz, 2020; Sraku-Lartey et al., 2020). This lack of consciousness has led to minimal efforts or

initiatives aimed at making a difference (Khan & Nawaz, 2020; Khatibi et al., 2021).

To close Ghana's coastal communities' enormous climatic knowledge gaps, understanding public views on climate change, and the obstacles that prevent mass understanding of climate change communication are crucial in planning and directing successful future climate change communications (Chadwick, 2017). Achieving this requires assessing the current climate change communication to identify and address any perceived challenges that confront people's understanding of the climate information to encourage behaviour modification and social learning within national contexts (Mcgahey & Lumosi, 2018). This is at the heart of the study or the gap it seeks to leverage.

Purpose of the Study

Current climate change communication does not appear to match the level of public understanding and involvement required. The task is to find more effective communication methods. This is why the main objective of the enquiry is to evaluate current climate change communication through coastal communities' perceptions in Ghana. Knowing what obstacles impede audience's comprehension of climate change is critical to developing and targeting successful climate change messaging, as well as gaining insight into what topics should be addressed in future communications (Chadwick, 2017).

Specifically, the study aims to:

1. examine coastal communities' awareness and perceptions of climate change.

6

2. investigate the relationship between demographic characteristics and perception of climate change communication.

3. identify barriers or challenges that militate against coastal communities' understanding of climate change communication.

4. explore how the challenges faced in understanding climate change communication have impacted coastal communities' adaptation.

5. examine ways of improving climate change communication for effective adaptation

Research Questions

1. What is the level of awareness and perception of climate change among coastal communities?

2. What demographic characteristics (such as age, gender, education, etc.) influence the perception of climate change communication in coastal communities?

3. What barriers or challenges hinder coastal communities' understanding of climate change communication?

4. How have the challenges in understanding climate change communication affected the adaptation strategies of coastal communities?

5. What are effective ways to improve climate change communication to enhance adaptation efforts in coastal communities?

Hypotheses

H_0—There is no association between religion and perceptions of climate change causes among selected coastal populations of Ghana

7

H₀—There is no association between demographic characteristics and awareness of climate change among coastal populations of Ghana

Significance of the Study

A careful analysis of climate change communication literature has established a trajectory where researchers have been looking at the factors that impact public awareness of climate change (eg. Beard, 2012). Some authors who have assessed climate change communication strategies and interventions have employed quantitative methods (e.g Greenhalgh, 2011; McClendon, 2015) and qualitative approaches such as discourse analysis (e.g Merner, 2017). Combining the two approaches in a single study will result in a complete analysis of the findings since mixed-method research compensates for the shortcomings of both methods while leveraging on their strengths (Creswell and Plano Clark, 2018: Ohene-Asante, 2015). The goal of this research is therefore to look at what is meaningful from both positivist and constructivist perspectives (Biesta, 2010).

The practical orientation of a technique that offers the researcher a variety of instruments to be employed in a varied context in line with the study design is reflected in mixed-method research (Shah & Al-bargi, 2013). Evaluating the success or otherwise of a climate change communication strategy or intervention requires a comprehensive report and understanding that will be generated when methods are combined. This innovative way of assessing climate change communication strategies will provide new useful information on the topic in a different context that will provoke or instigate further research and influence a

8

multiplicity of audiences such as communicators, academia, policymakers, and the lay public (Tracy & Hinrichs, 2017). Specifically, the findings of the study will guide climate change communicators on what barriers to resolve in future global warming messaging so that the information is conveyed to their audiences effectively to resonate with local context and understanding. The research will be useful to academia as it will provide a base for potential research in climate change communication. The findings of this enquiry will alert policymakers on the need to incorporate and prioritise climate change communication in national climate change policies.

Delimitation of the Study

The research concentrated on perceptions, awareness, and challenges in understanding climate change communication strategies and did not go outside these variables. In terms of geographical scope, the research was restricted to respondents of the selected coastal communities. Inferences that arose from the findings were generalised to the communities studied.

Limitation

Notwithstanding the study's progress, the investigator encountered significant difficulties. As a result of some community residents' non-cooperativeness, the researcher received disapproval from several individuals. Some people in the community believed that granting interviews was a waste of time because prior research in their villages had failed to produce real results. In addition, the interview approach chosen to gather data from the populations presented a challenge. The task of translating the questions into the respondents'

9

native language and documenting their responses, which had to be translated into English, was onerous. As a result, there was a risk of misinterpretation while posing questions and documenting replies.

Definition of Terms

Communication—It is a method of sending messages from a sender to a recipient across a medium or channel (Cobley & Schulz, 2013).

Climate change—Change in the weather for a long period (Nwankwoala, 2015).

Adaptation—The adjustment of ecological or social systems in response to a current or projected climatic stressor or its repercussions, to avoid damage and enhance resilience (IPCC, 2007)

Communication barrier—A barrier that prevents a message to reach its intended receiver (Pipaş & Jaradat, 2011)

Perception—The act of recognising and explaining sensory data (Mensah, 2018).

Climate change awareness— Awareness of climate change is a type of knowledge in which a person is aware of the current climatic conditions (Samuel et al., 2018).

Organisation of the Study

Five chapters make up the research. The first chapter serves as the thesis introduction, which consists of the background, the problem statement, aims, and objectives and hypotheses, significance, delimitations, and limitations associated with the inquiry. The second chapter describes the review of associated studies on the issue to be investigated. The materials and methods are presented in chapter three covering the design, research area, population and sample processes, data

10

collecting tools, data, gathering protocols, data processing, and analyses and summary. The fourth chapter is the presentation of the results and discussion of findings, while the fifth chapter concludes the work with a summary, conclusions, and suggestions.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents a review of associated publications on climate change communication. The review concentrates on the theoretical aspect of the study, the conceptual and reviews of empirical studies.

Theoretical Framework

The study is based on Paulo Freire's participatory development communication concept, which he popularised in the 1970s (McPhail, 2009). The theory blends one-way monologic and two-way dialogic communications theories to integrate all stakeholders in the development process (Tufte & Mefalopulos, 2009). Given that no one communication tool can effectively express climate change, a holistic and structural participatory method based on people's participation and empowerment is required (Evans et al., 2018). Furthermore, climate change communicators must recognise that science has varied meanings for different individuals, and that science communication should accommodate this diversity (Howarth et al., 2020) to ensure successful messaging to yield the efficacy of climate change adaptation (Singh et al., 2021). Figure 1 illustrates the theoretical framework used for the study.
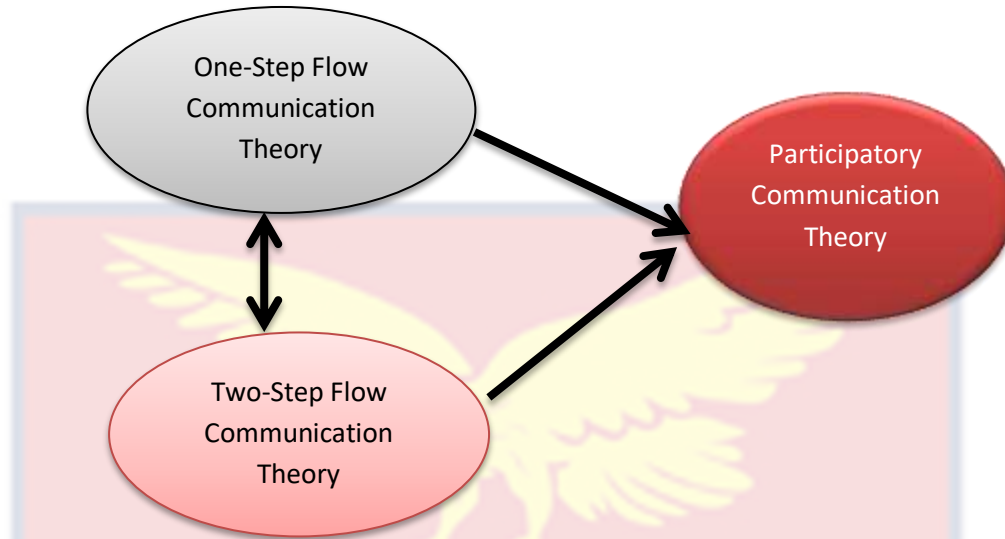
Figure 1: Theoretical Framework

Source: Author's construct (2022)

One-Way Communication Model/Theory

Early models of public dissemination considered communication as a one-way activity with no more than two routes for information exchange (van Ruler, 2018). This communication approach concentrates on products like television or radio shows and has the ability to engage a huge number of individuals over a limited period (Kulabako, 2006). External change agents are responsible for the activities, with little to no opportunity for participation. This type of communication is monologue-like, top-down, non-interactive and linear (Tufte & Mefalopulos, 2009) that educates, persuades, or orders (Centre for the Education and Study of Diverse Population ([CESDP, 2006]). Merely getting the message to the intended receiver is sufficient to complete the communication under this theory (van Ruler, 2018). Science messaging implies that ignorance is the root cause of a paucity of social engagement for science and innovation. Due to that,

13

many studies on the topic have centered on the idea of scientific education, that is premised on the deficiency paradigm (Simis et al., 2016). The information deficit model (IDM) postulates that the general audience is scientifically ignorant (McDivitt, 2016). Comparing the information deficit model to Laswell's linear model, the former probably has its root in the latter. Laswell's model is regarded as one of the most prominent messaging paradigms since it depicts a one-way information exchange (Mulder, 2018). The deficit model indicates that scientific information is transmitted from scientists to the general audience in a uni-directional flow. The hypothesis has however been criticised. Critics claim that leaders and followers exchange views rather than information from leaders to followers during the engagement process (Osae-Addo, 2015). Perrault (2013) criticises the model's oversimplification of science as a "knowledge-making factory" from which truth originates. It is argued that such a viewpoint misses science's role as a social institution. Participatory theorists attacked the dominant theory for supporting a top-down, ethnocentric, and paternalistic view of development that was based on a western conception of progress. Since the prevailing model sees individuals as docile consumers of this body of information that has already been prepared by outside providers, it fails to take into account the realities of the underprivileged (Brown-Addo, 2012).

Two-Step Flow Communication Theory

The two-step flow concept of transmission indicates that interpersonal encounters have a far bigger impact on public perception than mainstream media channels (Osae-Addo, 2015). Paul Lazarsfeld, Bernard Berelson, and Hazel

14

Gaudet introduced the two-stage flow concept in 1948 (Encyclopedia Britannica, 2016). This paradigm postulates that most people get their knowledge through their social connections instead of the mainstream press. Thus, rather than directly influencing citizens, mass media impacts them indirectly via interpersonal interactions (Arlt et al., 2018; Encyclopedia Britannica, 2016). According to the writers, opinion leaders get information from the media and pass it on to less engaged members of the public (Encyclopedia Britannica, 2016). Moser and Dilling (2012) suggest that various elements of face-to-face messaging make it more successful in conveying climate change than the mainstream press. These include the personal touch of face-to-face dissemination, the use of nonverbal hints, and the fact that direct communication permits conversation to arise between communicators and their audiences. The promotion of a two-way interactive and participatory communication processes, central to indigenous communication systems, enables the communicator and the audience to create rapport (Chari, 2016).

However, the notion has been critiqued for being overly simple. Critics claim that the transmission of information through the media is more than a two-step approach (Osae-Addo, 2015). Another area of dispute is that the two-step flow paradigm was created when television and the internet were not invented. The responses of individuals to publications and radio programmes were used in studies to suggest that interpersonal contact is more common than daily media intake. However, recent research on daily behaviour during the age of television dominance seems to suggest the reverse (Encyclopedia Britannica, 2016).

According to national polls, individuals rely far more on mass media than on personal contact. Only a small fraction of people share the knowledge they acquire through the media with their friends (Encyclopedia Britannica, 2016).

Participatory Communication Theory

The Brazilian scholar, Paulo Freire popularised the participatory communication theory in the 1970s which attained prominence in the 1980s (McPhail, 2009). The use of two-way, dialogic, or participatory communication has transformed local developmental project implementation since the 1970s. As a result of this change, attention was ultimately diverted from development experts and toward the hitherto silent or marginalised public (Brown-Addo, 2012). The activity of disseminating knowledge among stakeholders involved in developmental processes through discussions in order to generate shared knowledge and collective action for decision-making is known as participatory messaging (Aminah, 2016). Interactive methods for developmental messaging, or information flow is useful for accomplishing social advancement objectives, such as raising general consciousness of important issues, increasing access to knowledge, leveraging existing resources, and mobilising communities to work towards common objectives (Vyver & Vyver, 2018). Consequently, the collaborative approach allows everyone an equal chance to share their expertise and encourages participation in conversations so that people can offer solutions and ideas to problems (Vyver & Vyver, 2018) contrary to one-way persuasive communication (Jooste, 2014).

Participatory communication produces greater opportunities when community members are involved in decision-making (Jackline, 2017; Vyver & Vyver, 2018). There is an assumption that by engaging local residents in initiatives that impact their economic, social, and cultural progress, their enthusiasm is sparked, leading them to provide valuable suggestions for improving future development projects (Mbakogu, 2015). It also creates space for dialogue and promotes community learning and collaborative reasoning among residents (Tufte & Mefalopulos, 2009). When individuals can voice their grievances and talk about their difficulties, they may work together to devise solutions (Kulabako, 2006; Vyver & Vyver, 2018). Citizens' empowerment via active participation in the identification of issues, formulation of solutions, and execution of developmental initiatives are at the forefront of discussion (Tufte & Mefalopulos, 2009). The major purpose of the bi-directional information exchange method is to involve parties to explore a problem and define the desired change, rather than convincing them to embrace a preconceived change. Participation is a multi-person contact that produces complete and effective discussion, and no communication relationship can be created without dialogue (Vyver & Vyver, 2018). While participatory tactics are frequently utilised with fewer participants, degree of engagement as well as interaction is often significantly higher than when individuals are passive viewers or consumers of communications (Kulabako, 2006).

The participatory information dissemination model claims not to abolish essential information exchange roles connected with message distribution but

17

instead expands them to incorporate additional collaborative means of messaging (Tufte & Mefalopulos, 2009). That novel understanding encompasses both the monologic and dialogic aspects of communication types. It asserts that development communication may be fully used when both are thoroughly comprehensive and appropriately employed, if necessary (Tufte & Mefalopulos, 2009). The fact that the two primary communication approaches rely on varying theoretical viewpoints and methodological frameworks should not be viewed as a flaw, but rather as a strength capable of dealing with the complexities of many circumstances (Tufte & Mefalopulos, 2009) such as climate change (Chari, 2016).

In spite of the various benefits of participatory communication, the approach has also been criticised. The difficulty of providing a clear definition of the term participatory and the amount of engagement that can be considered participatory is one of the primary challenges of the method (Osae-Addo, 2015). Though theorists and academics praise it, putting participatory communication into practice is challenging because decision-makers are more interested in visible outcomes, which is difficult to achieve with this method of growth in the short term (Mefalopulos, 2003). For fear of losing their established positions, development agents are sometimes hesitant to undertake participatory programmes (Osae-Addo, 2015). Lastly, participatory communication can be expensive in regards to funding, time, and the recruitment of skilled development communicators. Because most programmes and projects rely on funding that is not always available, therefore, development agents are often compelled to limit the scope of participation (Osae-Addo, 2015).

Indigenous Participation for Development in the Ghanaian and African Context

Local engagement, native wisdom, and other socio-cultural elements have become some of the key concepts in societal growth and development research over the last twenty years (Carson et al., 2018; Mbah, 2019). The feasibility of traditional wisdom and societal engagement have been proposed as some possible solutions to the current indigenous community development deadlock (Boadu et al., 2021). Indigenous knowledge systems and ideologies are undeniably useful. There are other studies, such as one that examines biodiversity through the prism of native wisdom (Hens, 2006); native wisdom and socioeconomic advancement (Yarrow, 2008); local expertise and marine fishing (Akyeampong, 2007; Appiah-Opoku, 2007); and using local wisdom in environmental research (Codjoe et al., 2014; Derbile, 2013; Sullo et al., 2020). Some researchers have looked at Ghana's traditional wisdom and climate change, as well as eco-cultural tourism (Guri et al., 2021) and the protection of natural resources. Many African communities benefit from local knowledge or traditional wisdom. Therefore, it would be detrimental to local knowledge if local residents only embraced western models, methodologies, and practises of development (Mbah, 2019).

Current scholarship has made it a point to include local knowledge into traditional development approaches (Agyemang et al., 2019; Bardy et al., 2018; Hlalele, 2019; O'Donoghue et al., 2019). According to a recent narrative, incorporating indigenous knowledge into established development frameworks is the most reliable approach to escape the socioeconomic deadlock that currently

exists in Africa (Bardy et al., 2018; Mbah, 2019). Bardy et al. (2018), theorised that Africa's quest for social, political, and economic growth must take advantage of its ethnic variety and traditional wisdom networks. In view of this, Boadu et al. (2021) provided a framework for incorporating indigenous knowledge structures, traditions, and other social elements in community-led development programmes to enhance long-term sustainable growth.

Utilising a process of analysis, Boadu et al. (2021) proved that there is a gap between local knowledge networks, beliefs, customs, and other social elements and current collaborative social developmental initiatives. Again, Boadu and Ile, (2018) asserted that the ineffectiveness of several social policies and intervention programmes in Ghana is attributable to a paucity of community involvement in the development, execution, and assessment of those policies. According to Fridy and Myers (2019), community-based policies and programmes might accomplish their goals if official institutions are formed to support local initiatives by working with

authorities, local institutions, and civil society organisations.

Review of Conceptual Issues

The conceptual review centers on public understanding and consciousness of climatic changes, perceptions of climate change as well as climate change communication, the nexus between demographic factors and global warming belief, challenges/barriers to public understanding or communicating global warming, and how to improve global warming communication for efficacy adjustment. The review is summarised by the framework (Figure 2).

20
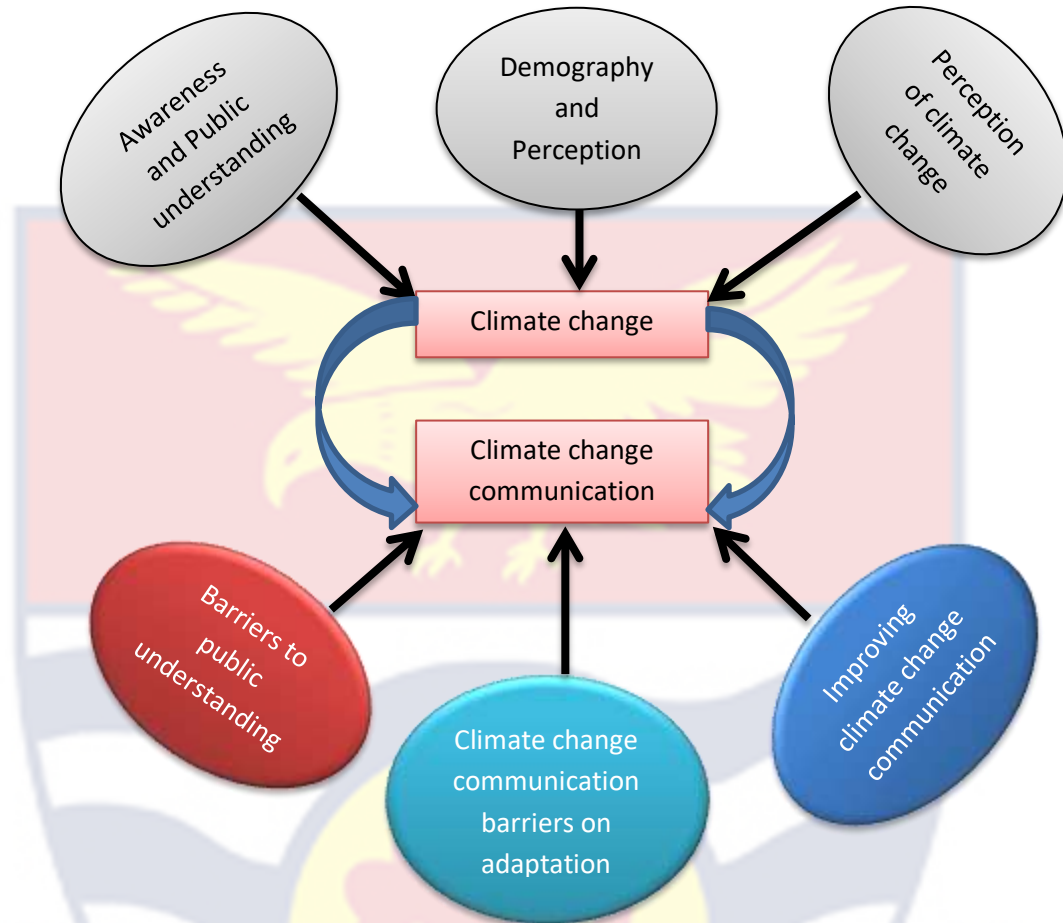
Figure 2: Conceptual framework used for the study of climate change and its adaptation communication

Source: Author's construct (2022)

Awareness and Public Understanding of Climate Change

Being a crucial subject, the impacts of climate change necessitate a significant degree of general understanding and knowledge (Acquah, 2011). According to research conducted globally, the notion of changing climate is widely misunderstood (Capstick et al., 2015; Leiserowitz et al., 2015; Weber & Stern, 2011). Tackling climate change and its concomitant issues, awareness and comprehension of climate fluctuation and change among the general public are

crucial (Ohene-Asante, 2015). Climate change knowledge, understanding, and attitudes are essential variables in tackling the problem because they impact the public's commitment to climate-related legislation (Khatibi et al., 2021; Lorenzoni & Pidgeon, 2006), in addition to their actions in coping with climate change (Khatibi et al., 2021; Leiserowitz, 2007; Wolf & Moser, 2011). According to Asekun-Olarinmoye et al. (2014), people need to be adequately informed about circumstances before they may act appropriately. Climate change awareness refers to people's understanding of the issue, its effects, causes, and consequences (Khan & Nawaz, 2020). Increasing consciousness also entails informing and educating people about a subject to influence their attitudes, behaviours, and perceptions to fulfil a specific goal or purpose (Sayers, 2006). Households in coastal areas must comprehend and be mindful of global warming to cope with its repercussions (Samuel et al., 2018).

According to recent research, while climate change coverage in the southern hemisphere is expanding, there is an inadequate volume and accuracy of reporting, and the important fact is not readily available to individuals who are impacted (Guenther et al., 2018; Painter, 2014; Shanahan, 2009). Similarly, while the majority of Africans have knowledge of shifting weather patterns and cycles, they have little understanding of worldwide climate warmings (Ohene-Asante, 2015). The vocabulary associated with climate change is misunderstood, and there are no conventional equivalents in African dialects (Ohene-Asante, 2015). Even when individuals seem informed about environmental changes, the notion may not always be fully comprehended (Burton et al., 2012). This is due in part to a

paucity of awareness programmes and the reality that African nations face far numerous challenges, spanning from deprivation to social instability (UNFCCC, 2007; UNDP, 2007). As a result, global warming is not a major concern.

Africa's significant susceptibility to climate change also stems from its limited adaptation capability as well as its level of exposure to anticipated variations (Steynor & Pasquini, 2019). Similarly, in a survey of small-scale and commercial producers in the agricultural sector of Ghana, it was discovered that both categories of producers were aware of global warming, with large-scale producers having a deep knowledge than peasant farmers. Their observations of weather variabilities influence their attitudes toward global warming (Yaro, 2013). Each farming class is aware of climate change, but their explanations vary from natural normalcy to religious reasons. Notwithstanding, small-scale growers linked climate change to social and religious/moral factors, commercial farmers cited more environmental factors consistent with scientific explanations (Yaro, 2013).

Climate Change Perceptions

The act of recognising, gathering, storing, and analysing sensory data is referred to as perception (Mensah, 2018). Research indicates that how people perceive global warming provides a cornerstone in developing techniques to address the repercussions of climate change (Yu et al., 2013). However, from a survey of societal attitudes toward global warming, Leiserowitz (2006) discovered that several individuals are misinformed about climate change research, and therefore are particularly perplexed at the form, origins, and consequences of

23

global warming. Substantiating the afore-mentioned finding in research on African global warming points of view, Ejembi and Alfa (2012) reported that besides widespread knowledge, there were different and contradictory perspectives regarding the drivers and signs of global warming across and within African communities. Codjoe et al. (2013) conducted comparative research among cocoa producers in Ghana and discovered that growers clearly understand climate change to some degree. However, the farmers' perceptions of the primary global warming factors include God's purpose for the culmination of age; high equipment use on earth, atmosphere, and water; logging; indiscriminate bush burning preceding planting or the quest for game; and cultivating alongside river systems, and unlawful mineral extraction (Codjoe et al., 2013).

Causes of Climate Change

Human as an Agent of Climate Change

Global warming is now a fact with its consequences manifesting in many regions of the globe (Islam et al., 2021). There is no gainsaying that human activities are changing the climate (Hasan, 2015; Nwankwoala, 2015). With strong certainty, current climate research assigns human activity as the dominant source of warming that has been witnessed during the past century (Leggett, 2018). Climate change is an outcome of man's activities such as socioeconomic development (Chadwick, 2017; Leggett, 2018; Walsh et al., 2014). Combustion of fossil fuel, destruction of forest cover, and rearing of livestock are all contributing to the progressive modification of the Earth's atmosphere and heating rate (Jackson, 2021). They release vast amounts of carbon emissions into the sky,

24

magnifying the greenhouse effect and adding to global warming (Government of Canada, 2019; Denchak & Turrentine, 2021; Met Office, 2019; Onoja & Enete, 2011). When fossil fuels are burnt, carbon dioxide, a greenhouse gas, is emitted (Government of Canada, 2019; Met Office, 2019). Deforestation releases carbon that hitherto has been removed back into the atmosphere. Africa's deforestation rate is about double that of the rest of the world, with the continent losing approximately 4 million hectares of forest per year (AfDB, 2012). Farming and road construction can change the earth's reflectivity, resulting in localised heating and cooling (Denchak & Turrentine, 2021; Government of Canada, 2019). Even while the earth's natural forests and oceans trap carbon emissions from the sky through the photosynthetic process and other activities, these natural absorbers are incapable of keeping pace with current rising emission levels (Denchak & Turrentine, 2021). The natural greenhouse effect has been exacerbated because of the increasing concentration of carbon emissions in the environment (Government of Canada, 2019).

Natural Causes of Climate Change

Natural variables like fluctuations in volcanism, insolation, and the Earth's revolution around the Sun may all influence the atmospheric temperature of the planet (Onoja & Enete, 2011). The two most important factors influencing present climate change timeframes are fluctuations in volcanism and shifts in solar energy. Sulphur dioxide (SO_2), moisture, particles, and ash have all been documented to be discharged into the air as a byproduct of seismic activity. Large amounts of gases and ash are shown to have long-term effects on the earth's

climatic conditions through increased terrestrial albedo and condensation of the atmosphere (Jackson, 2021; Onoja & Enete, 2011). Eruptive volcanoes, however, are sporadic and have just a transient effect on the climate (Government of Canada, 2019). Although the sun's energy output seems to be steady from a daily point of view, tiny fluctuations over time can cause climate change (Onoja & Enete, 2011). Again, variations in solar output have influenced climate patterns over the past centuries, but they are insignificant when compared to man-made carbon emission contributions (Government of Canada, 2019). Furthermore, variations in the axial tilt of the planet can cause minor but significant changes in the severity of the seasons (Onoja & Enete, 2011). The Earth's crustal motions have altered the shape, structure, place, and topography of the continents, in addition to the ocean bathymetry. Topographic and bathymetric changes, in turn, have had a tremendous influence on the flow of both the air and the oceans, affecting the climate of the Earth (Jackson, 2021).

Impacts of Climate Change

Climate change has sparked global debate owing to its negative effects on humanity's living conditions (Asante & Amuakwa-mensah, 2015). Global warming presents a huge threat to Africa's long-term development and prosperity (Asante & Amuakwa-Mensah, 2015). Changes in rainfall patterns, which reduce agriculture productivity and reduce food security, are among the long-term consequences of climate change (Abrams et al., 2017; Carmin, 2012), deteriorating water security (Müller-Kuckelberg, 2012; Tadesse, 2010), dwindling fish supplies in huge lakes as temperatures rise (UNDP & GEF, 2018;

26

Wondimagegn & Lemma, 2016), and changes in vector-borne illnesses (Agbeko et al., 2018; Asekun-Olarinmoye et al., 2014; FAO, 2008). The Arctic is heating at a rate double that of the rest of the planet. As ice caps thaw into the water, our oceans will rise, putting coastal habitats and low-lying communities at risk (Anne et al., 2018; Asante & Amuakwa-mensah, 2015; Denchak & Turrentine, 2021). High temperatures exacerbate and enhance the occurrence of environmental incidents such as hurricanes, flooding, heatwaves, and wildfires. The impacts of these disasters may be devastating and expensive, limiting access to potable water, causing out-of-control wildfires, damaging infrastructure, triggering noxious-material spills, destroying the air, and resulting in deaths (Denchak & Turrentine, 2021).

Climate change has several effects on human health (Muller-Kuckelberg, 2012). Severe weather catastrophes like large tornadoes and floods can inflict wounds, tainted potable water, and storm surges, all of which might imperil critical property or force population relocation. Relocation comes with its new sets of health hazards, such as congestion, trauma, social unrest, a lack of safe water, and the transmission of contagious diseases (Denchak & Turrentine, 2021). Climate change affects coastal communities and fishery supplies—which are vital to the indigenous industry, thereby devastating their living conditions and putting such communities on the verge of economic collapse. Soaring sea surface temperatures impact the distribution and number of submerged taxa, as well as fading of corals, which can kill entire reef ecosystems that support over 25% of all aquatic life (Denchak & Turrentine, 2021; Anne et al., 2018). According to a

27

Bangladesh study, scientists estimate that climate change would cause changes in sediment and flood regimes in the Padma River owing to higher precipitation and excessive temperature (Islam et al., 2021).

Climate Trends and Impacts in Ghana

The impacts examined are not different from Ghana. Ghana's climatic trend has shown declining rainfall patterns with rising warmth (IPCC, 2007). The Ghana Meteorological Agency's review of climatic statistics spanning 1960 to 2000 demonstrates a consistent and noticeable surge in warming at the surface as well as a corresponding decline in rainfall total in the forest zone of the Western Region (Boon & Ahenkan, 2012). In the past 30 years, the annual mean temperature has risen by 1°C (UNEP & UNDP, 2013). Across all agro-ecological zones, the projected increase in average annual temperatures ranges from 0.8°C to 5.4°C from 2020 to 2080. Similarly, the anticipated decrease in average annual rainfall totals is estimated to range from 1.1% to 20.5% over the same period based on archival data (UNEP & UNDP, 2013). The current existing data indicated a rising sea level of 2.1 mm each year over the past three decades, with estimates of 5.8 cm, 16.5 cm, and 34.5 cm by 2020, 2050, and 2080, respectively (UNEP & UNDP, 2013; USAID, 2011). Climate change presents itself in Ghana via escalating temperatures, decreased total precipitation, greater variability of change, rising sea levels, and a higher frequency of weather abnormalities and natural disasters (MoFA, 2018; UNEP & UNDP, 2013; USAID, 2011). These manifestations have a detrimental influence on infrastructure, water supply, food security, and coastal and rural livelihoods (USAID, 2017). Temperatures will

keep rising, and rainfall patterns will become increasingly erratic. More intense rainfall will likely enhance erosion, whereas less overall rainfall would likely reduce water flow (MoFA, 2018).

Moreover, coastal erosion exacerbated by increasing sea levels is devastating a large section of Ghana's east coast, jeopardising millions of dollars invested in infrastructure. Torrential rains are severely impacting road network, resulting in astronomical yearly road maintenance costs that hinder the necessary extension of road infrastructure to improve accessibility (UNEP & UNDP, 2013). As natural barriers such as barrier islands vanish, projected sea-level rise may lead to increased erosion along sandy coasts and subject various coastal communities to severe storms (USAID, 2011). Water availability will deteriorate as well (MoFA, 2018; Muller-Kuckelberg, 2012). Climate change consequences on health in Ghana is undeniable, with over half of the country's illnesses attributed to climatic variability and exposure. Furthermore, the looming threat of climate change exacerbating disease transmission, such as malaria and meningitis, underscores the urgent need for proactive measures to mitigate health risks in the face of environmental change.

Challenges in Communicating Climate Change

Nature of Climate Change

Global warming is inherently challenging for communicators to convey. Climate change is a long-term, slow-moving, complicated, and abstract phenomenon (Filho, 2019; Glaas et al., 2015; Somerville & Hassol, 2011). It is multifaceted, difficult to explain, unpredictable, and likely to emerge in a variety

29

of ways based on where you are (Monroe et al., 2017). This is a two-fold complexity: one stemming from the intricacy of the climate change phenomenon, and the degree of difficulty communicating it (Nerlich et al., 2010). To Corner et al. (2018), climate science is riddled with uncertainty, which makes communication with non-scientists difficult. The intricacies of the science underpinning global warming render it hard for people to grasp the mechanisms underlying global warming and the rationale regarding short and long term consequences (Aksit et al., 2018). The "physical" characteristics of the climate change event provide substantial hurdles to communicators in regards to attracting and sustaining the public's interest sufficient enough to genuinely involve them in the subject (Markowitz & Guckian, 2018). Scientific descriptions of global warming drivers, impacts, and doubts may be perplexing, thus demotivating to those who are inexperienced with a modern scientific framework (Mcnaught & Warrick, 2014).

Misinformation about Climate Change

Misinformation, or information that people believe to be real even when it is wrong, may have serious societal ramifications (Cook et al., 2017). Myths and disinformation regarding global warming, like a false assertion that there is scientific convergence, are harmful since they obstruct the dissemination of actual scientifically proven knowledge (Markowitz & Guckian, 2018). The repercussions of audiences depending on such ingrained misinformation are considerably more troubling than the effects of ignorance or knowledge gaps since these ideas are frequently held passionately (Leiserowitz, Maibach, Roser-

Renouf, & Hmielowski, 2011) which can result in wrong judgements that harm community and people (Markowitz & Guckian, 2018). Conversely, the general public lacks comprehensive information about the current state of climate change. For instance, skeptics assert that the threats of climate change may be significantly higher than those projected by the 'Intergovernmental Panel on Climate Change (IPCC)' and that the policymaking society is idly sitting while the world burns (Mcbean et al., 2000). Current research demonstrates that, despite an increase in climate change coverage in the global south, the amount and accuracy of reportage are inadequate, and individuals impacted do not have access to essential information (Guenther et al., 2018; Painter, 2014; Shanahan, 2009).

Lack of Scientific Education

Scientific education has shown some promise in improving public understanding of not only climate change but also environmental communication. However, science communicators encounter the problem of properly merging scientific information with indigenous knowledge (Lumosi & McGahey, 2016). This problem is compounded by the problem of prevalent scientific ignorance, which is connected to people's confidence and belief in others with whom they reflect cultural beliefs and viewpoints. For some individuals, public representatives who feel that climate change is a ruse are seen as trustworthy communicators (Monroe et al., 2017; Somerville & Hassol, 2011). Scientific illiteracy specifically refers to laypeople's failure to comprehend the complexity of climate science (Wibeck, 2014). When the general public lacks the necessary experience or is uncomfortable with graphs and statistics, scientific material may

31

be too difficult to comprehend. As a result, basic scientific messaging will be ineffective in changing public behaviour (Tan et al., 2008). According to Filho (2019), there is some misunderstanding among the general population about what climate change is and how it impacts individuals.

Perceptions and Beliefs

The perceptions and beliefs people hold about climate change can sometimes be problematic in communicating the complexities of climate change. This is because such beliefs and perceptions tend to negatively influence people's actions toward adaptation and mitigation strategies. People's religious views impact the way they recognise and comprehend climate change. According to Wolf and Moser (2011), religious views can influence whether or not individuals acknowledge human beings as responsible for altering Earth's natural weather or temperature regime. The atmosphere has been viewed as God's domain for most of human history, and others just cannot accept that humans can influence it. Weather calamities are still referred to as "acts of God" (Somerville & Hassol, 2011). Individuals or countries do not seem to have any authority, power, or obligation for what belongs to God, according to those who believe in a superior force being accountable for meteorological events and any prospective changes (Wolf & Moser, 2011).

According to one study, 15% of Americans accept that God is in charge of the weather and that man is not to be blamed for causing global warming, while another 14% think climate change is a harbinger of impending doom (Roser-Renouf et al., 2016). Furthermore, messages that contradict cultural standards are

32

more easily ignored than those that acknowledge and support such values (Dixon & Hubner, 2018; Monroe et al., 2017). Public communication in this regard must accept that people vary, and possess various mental, societal, as well as political motivations behind the decision to think, feel, and act or refrain from acting in response to global warming (Leiserowitz et al., 2021).

Framing Challenge

Individual publications have demonstrated the value of framing climate change for effective communication (Badullovich et al., 2020). Environmental and scientific topics such as climate change have been regularly communicated to the concerned public using framing as a strategic communication tool (Li & Su, 2018). However, poor framing of communication messages adversely affects public understanding (Badullovich et al., 2020; Filho, 2019; Mcgahey & Lumosi, 2018). The purposeful usage of certain phrases, thoughts, and theories (including metaphors) to emphasise the importance of specific aspects of a problem or issue and influence others' thinking is known as framing (Druckman, 2001; Li & Su, 2018). Global warming is often characterised primarily as an ecological crisis, but must be framed as a danger to civilisation's very basic needs including nutrition, water, peace, and security (Anastasiadis, 2006; Somerville & Hassol, 2011). Climate change is considered part of the environmental discourse and is therefore perceived via the "green len"—people see climate change as an environmental problem rather than a social one (Anastasiadis, 2006).

33

Language Barrier

The most challenging ability to master is the capacity to communicate in such a basic dialect that the desired message is delivered to everyone at once (Kaplan, 2019). In the age of globalisation and connectivity, language remains a barrier to getting our thoughts across (Abuarqoub, 2019). The language barrier hinders verbal communication and generates a linguistic gap between social interactions (Chen, 2018). According to Ma (2010, cited in Chen, 2018), a language barrier commonly describes the situation where individuals lacking a common language attempt to communicate with each other. A linguistic barrier to communication refers to the inability to convey information with a dialect. The failure to use words that the other person understands stops a message from being understood (https://www.businesstopia.net/communication/language-barriers). As a result, misinterpretation is by far the most problematic of all language communication issues (Kaplan, 2019). It is difficult to interpret verbal expressions from one dialect to the other since most of our ordinary speech is analogy, metaphorical, proverb, idiomatic, or collocations, all of which are influenced by social upbringing and geographical settings (Kaplan, 2019). Related to language barrier is the choice of words used by scientists and communicators of climate change. Many terms that appear natural to scientists are perplexing terminology for the rest of the world (Somerville & Hassol, 2011). The varied interpretation makes climate change communication difficult to understand for nonscientists and lay people.

Challenges with Communication Channel

Climate change communication necessitates choosing a suitable medium for communication since successful messaging needs to focus on particular audiences (Moser & Dillings, 2012). This is because understanding these sources enables producers of climate change information to pinpoint reliable and accessible channels for spreading their knowledge (Siyao, 2021). According to Sampei and Aoyagi-Usui (2009), it is reasonable mentioning that news reportage of anthropogenic global warming has an immediate, if transient, influence on public perception and concern about the subject. Furthermore, Moser and Dilling (2012) contend that the most impactful method for engaging audiences on climate change is through mass communication. In addition to providing a platform for participation and empowerment, the media acts as a watchdog, holding authorities, politicians, and people in all spheres of life accountable (Evans et al., 2018).

The press is crucial for disseminating climate change scientific information, but its efficacy is challenged in Africa due to restricted media access and low literacy rates (Chari, 2016). Several academics have highlighted various institutional and professional barriers to the media's capacity to communicate climate science effectively (Chari, 2016). Because of the complexity of climate science problems, indigenous communication systems must be included in climate change communication strategies. Indigenous communication skills are more suited to discussing a complex problem like climate change since they include interpersonal contact (Chari, 2016).

35

The Problem of Trusted Messengers

Those who deliver a message are typically referred to as messengers (Moser, 2010). Trusted envoys are individuals whom members of the community view as reliable sources of information (Wright et al., 2021). The credibility and source of the information are paramount in educating the masses about global warming. This is because sometimes the most carefully crafted, audience-customised information or programme will fail to engage listeners if given by the inappropriate messenger (Markowitz & Guckian, 2018). Every strategic communication endeavour begins with selecting the appropriate messenger. What is being said can matter considerably less than who is saying it (https://com-matters.org/attribute/messengers/). For instance, according to a report cited by Hafner et al. (2019), The American Psychological Association (APA) suggests that distrust of government communications could significantly hinder climate change action. Similarly, Bolson et al. (2019) studied a method of transmitting climate change message when he modified the source of communication while keeping the message's substance constant and discovered that the inclusion of military personnel as a source of a pro-climate petition can considerably boost its persuasiveness, particularly when the plea emphasises the consequences of global warming on US state security (Bolson et al., 2019). Another research conducted in America discovered that when communication is delivered by others who share their opinions and worldviews are more inclined to be believed and trusted (Moser, 2010).

The Problem of the Mass media

Another issue is how the media covers the problem. Every profession has rules that govern how it operates. This is similar to what happens in the media. Professional journalistic rules of balance control press messaging. Such journalistic traditions obstruct effective climate change communication, meaning that the mainstream press is unfit for disseminating message about these challenges. They frequently depict climate change as a contentious issue, portraying both sides as equally believable (Chari, 2016). As a result of the present media crisis, there are fewer experienced reporters with the necessary competence, resulting in inadequate and deceptive coverage (Somerville & Hassol, 2011). The conventional media is linear and has rendered the media aristocratic, with professional viewpoint being prioritised, restricting the involvement of ordinary people in the dissemination pathway. Journalists, scientists, legislators, and civic organisations have monopolised the communication process. One might contend that ordinary people's limited participation in discussions contributes to their inadequate knowledge and acceptance of climate change (Evans et al., 2018). The media is however broadcasting more risks than remedies, and the despondent ordinary man is taking little action (Mannar, 2014).

Psychological Distance

Researchers have identified psychological distance as a serious hindrance to climate action, prompting research into circumstances that allow remote and abstract concerns to be viewed as more local and palpable (Schuldt et al., 2018).

37

Many communications on the subject employ imagery of melting ice and glaciers, giving the audience the idea that global warming is a remote concern. General people believe that global warming cannot constitute a significant risk and is not an issue that requires immediate attention due to the long time frame and remoteness of its impacts (Jones et al., 2016; Tan et al., 2008). Individuals, according to the Construal Level Theory (CLT), use realistic, minimal conceptions to describe close occurrences and visual, and greater perceptions to depict far-off things. The CLT's concept means the more emotionally remote a situation is, the more imaginative it may be. As time passes, mental images become less concrete and more abstract (Jones et al., 2016; Van der Linden et al., 2015). When an event is not present in one's environment, it is psychologically distant (Trope et al., 2007). In contrast, a six-country study found climate change as more emotionally proximate to Africa than to industrialised nations (Steynor & Pasquini, 2019). This corroborates a conclusion of the study in eleven African nations, where global warming affects human life, hence it is no longer regarded as a theoretical issue (Burton et al., 2012). It is considered that minimising the mental and emotional gap from global warming may improve participation. Decreasing psychological distance, however, never correlated with greater involvement for global warming mitigating and response policies (Schuldt et al., 2018).

Ways of Improving Climate Change Communication

Making it Understandable

When people do not have the requisite expertise or are uneasy with charts and statistics, scientific facts might be too complex to comprehend. Consequently, basic scientific data is improbable to be useful in the campaign to alter behaviour. The information communicated must be coherent and delivered in a way that the listeners can grasp (Tan et al., 2008). In this regard, scientists are urged to talk in simple language and to select their words carefully since most terms that appear totally acceptable to researchers are impenetrable slang to the rest of the public (Somerville & Hassol, 2011). The supply of important information in kinds and formats that community members can understand is critical to community-based adaptation (Bisht & Ahluwalia, 2014). Using simple concepts, proper delivery channels, local language, and cultural norms relevant to the place must all be used to convey the information (Bisht & Ahluwalia, 2014). In addition, using local language and or translating climate change communication into the audiences' native language can also help them to understand the information well.

Aligning with Audiences' Values and Worldviews

Research has shown that individuals' principles and ideological beliefs impact their opinions on climate change more than their degree of scientific understanding (Corner et al., 2018). Ideological beliefs are collections of strongly held ideas and behaviours regarding the way the globe operates and how persons ought to interact with others. Regarding global warming, ideologies are frequently used as gauges to assist individuals decide whether or not the threat is severe.

39

Ideologies determine opinions on whether and how to react to climatic changes by influencing our perspectives of threats (Markowitz et al., 2014). Beliefs are the foundation upon which global climate views are developed (Corner & Clarke, 2017). In every messaging and involvement, linking with broadly held social ideals or localised areas of attention increases the likelihood that the science will be appreciated (Corner et al., 2018). Knowledge of what people currently think of climate change can assist communicators in identifying readily comprehensible phrases and ideas, correcting frequent misunderstandings, and developing acceptable cognitive images where these are absent (de Bruin & Bostrom, 2013). Aligning climate change communication with audiences' values, beliefs, and interests is therefore an effective way to instigate engagement (Howarth et al., 2020).

Use the Appropriate Messengers and Communication Channels

If a communicator meticulously crafts information, it is impossible to be successful if that message is given by a messenger that the public does not believe, appreciate, or like, or if the information does not find its target audience (Markowitz et al., 2014; Markowitz & Guckian, 2018). Successful participation involves finding and hiring trustworthy ambassadors, as well as interacting with the public via their preferred communication outlets (Markowitz & Guckian, 2018). Trusted messengers are individuals whom residents of the community view as reliable sources of information (Wright et al., 2021). Anyone whose personality, beliefs, and social connections are comparable to that of the public; somebody the community listens to and regards; and a person who can recognise

40

and relate with the public's ordinary interests and problems is an excellent communicator (Markowitz et al., 2014). These ambassadors not only share beliefs with the listeners but also converse in their tongues (ICLEI, 2011).

Framing Messages in the Right Way

Research has demonstrated the value of framing environmental change for efficient dissemination (Badullovich et al., 2020). Depicting global warming as an environmental hazard has been criticised as limiting the range of conceivable solutions, making it easy for people who are not in the environmental field to ignore it, and an issue considered only next to the pursuit of economic growth and full employment (Anastasiadis, 2006). Deliberative framing has been encouraged as it can help open up public dialogue and bridge partisan rifts and provides chances for novel legislative actions (Romsdahl, 2020). Climate change must be portrayed as a societal and economic issue to provoke engagement. If people know that climate change affects their daily lives, they will engage in behaviour that will reduce the impact compared to when they see it as an enironmental problem. It is, therefore, important to frame the communications to create a link between the public's values and the interests of a true climate-resilient future (Corner & Clarke, 2014, 2017).

Overcoming the Psychological Distance of Climate Change

There is the thought that decreasing the mental and emotional gap between people and climate change will increase engagement (Schuldt et al., 2018). Linking global warming to one's wellness is an instance of minimising social

41

barriers (Merzdorf & Pfeiffer, 2019). Climate discourse must be started on an equal platform, adopting plain rhetorics and experiences the general public is more inclined to (Corner et al., 2018). Personal engagement is heightened with local frames and proximity signals (Merzdorf & Pfeiffer, 2019). Other ways to reduce psychological distance are time framing—making it appear as though things would occur now instead of later reduces unpredictability. Hence, global warming should be presented as something that is more likely to occur than something that is unclear (Van der Linden et al., 2015). Localising global warming makes it personal, real, and more urgent to take action (ICLEI, 2011).

Misinformation Inoculation

Techniques for dealing with widespread disinformation include avoiding mistakes before they propagate or addressing flaws after they have been circulated. The inoculation theory entails recognising typical mistakes or erroneous perceptions that audience members may hold and correcting those mistakes in the message body. Misinformation such as lack of scientific consensus (Markowitz & Guckian, 2018), that global warming is not real (Van der Linden et al., 2017; Merzdorf & Pfeiffer, 2019) and the IPCC is an alarmist organisation creating alarmist scientific consensus (Van der Linden et al., 2017) among others, are found in the literature. In communications where it is acceptable to protect potential erroneous assumptions or logical mistakes like these, communicators can explicitly resolve and refute these concepts in their narratives so that readers recall the proper knowledge when they meet it afterward (Merzdorf & Pfeiffer, 2019).

42

Highlighting Solutions

Highlighting solutions rather than communicating the causes and impacts of climate change have shown a greater promise because it allows the public to imagine a more pleasant and desired futuristic society while remaining committed to the topic (Markowitz & Guckian, 2018). Individuals are inclined to regard climate crisis as a problem worth resolving when they feel there are accessible remedies (Markowitz et al., 2014). Turning away from instilling fear in individuals and instead emphasising the advantages of lifestyle adjustments that are required is critical to ensure long-term involvement and response (Howarth et al., 2020). A fundamental objective for environmental communicators is to enable individuals to visualise a better tomorrow that is free of catastrophic climate consequences for their families and communities. One method to achieve this aim is to provide the listeners with tangible, believable global climate solutions (Markowitz et al., 2014).

Review of Empirical Studies

This component of the literature review reports and results of studies linked to the subject (variables) under investigation.

Awareness, Public Understanding and Perception of Climate Change

Nearly six out of ten Africans (58%) are aware of climate change (Selormey et al., 2019). A descriptive analysis of the research by Ogunbode et al. (2019) in Nigeria found that 21.1% of the total number of respondents claimed awareness of global warming while 74.0% were not aware of the phenomenon and that the radio (76.9%) constituted the major source of awareness. The

43

consequence of this finding is that no source of information should be relegated but should be fully utilised so that the awareness is fully realised. Such sources include academic journals, friends/family and religious institutions which are less utilised by respondents in this survey (Ogunbode et al., 2019).

Similarly, individual area-level studies in Ghana show a higher degree of global warming consciousness. For instance, there was a 100% awareness among coastal Winneba (Ankrah, 2020), 97.6% among farmers in the Adaklu District (Mensah, 2018), 94% among the people of Greater Accra (Sarfo et al., 2019), and 71% among Ghanaians (Odonkor et al., 2020). However, according to an Afrobarometer study in Africa by Selormey et al. (2019), only 52% of Ghanaians are conscious of climate change and out of this proportion, only 21% can be considered climate change literate among the youth with secondary and post-secondary education. This corroborated the findings by Sraku-Lartey et al. (2020) on climate change perceptions and knowledge among the people in Offinso Municipality of the Ashanti Region where only 31.9% of the respondents were conscious of climate change, whilst 68.1% never came across climate change. Only 44.9% of people who had heard the phrase "climate change" recognised as well as comprehended the meaning of the word. The remaining 55.1% were aware of the term yet they did not understand it. In Odonkor et al. (2020), a greater number of people in Ghana had a hazy knowledge of what climate change meant. Only 43.9% said they understood climate change, and 11.8% said they did not know anything at all.

Causes of Climate Change

Crona et al. (2013) conducted a global study and discovered that 90% of responses attributed climate change to pollution. The location with the most consensus (93%) was the United Kingdom, whereas Ecuador (86%) had the least level of consensus. Automobiles, using fossil fuels for heat and power, deforestation, and animals all add to climate change, according to the majority of Americans (Leiserowitz et al., 2015). Logging, clear-cutting, burning, and other forms of vegetation loss are projected to generate 8.1 billion metric tonnes of carbon dioxide annually, which is responsible for more than 20% of global CO_2 concentrations (Denchak, & Turrentine, 2021). Approximately half of Africans (52%) ascribe climate change to manmade action or manmade action in conjunction with natural causes (16%). More than one-quarter (27%) think that natural processes solely are to be blamed for climate change (Selormey et al., 2019). Odonkor et al. (2020), in a similar enquiry in Ghana, discovered that a vast percentage of respondents (54.2%) blamed climate change on the combustion of fuels like petroleum and petroleum products, second by greenhouse emissions from automobiles (17.5%), forest loss (17.1%), and environmental phenomena like sea tides (17.1%). Only a small percentage of respondents (2.5%) named fertiliser-related nitrogen oxide pollutants in agriculture as a cause of environmental change (Odonkor et al., 2020).

Apart from the natural and human drivers of global warming reported in the literature, Roser-Renouf et al. (2016) indicated that some 15% of Americans think that it is God that controls the climate and for that matter, man cannot be

45

causing climate change and some other 14% hold the view that global warming is a sign of the end of time (Roser-Renouf et al., 2016). Similarly, a comparative study of farmers discovered that the vast majority of respondents (28.3%) believe global warming is evidence of God's purpose to herald impending doom (Boon & Ahenkan, 2012; Codjoe et al., 2013). This is not different from recent studies. A small percentage of the respondents (1.5%), however, blamed God for climate change (Odonkor et al., 2020). Again, 12% of people blame man's corrupt nature for climate change. Although 5% of the people who responded were conscious of global warming, they did not know what caused it (Codjoe et al., 2013).

Signs and Impacts of Climate Change

Following evidence of global warming, 84% of people worldwide acknowledged that rainfall trends significantly varied over the last three decades (Crona et al., 2013). The temperature has risen while rainfall has dropped, according to the findings of a quantitative study of climatic data (rainfall and temperature) in Sri Lanka. The perceptions of a large percentage of farmers were consistent with climatic data from statistics records. They thought the weather was getting warmer, and the rain was becoming less regular and shorter in length (Alikhan, 2013). A comparative study in Ghana found that in terms of rainfall, 84% of respondents saw a decrease, 12.8% witnessed rainfall unpredictability, whilst 2.4% and 0.8% experienced no change, and a rise in rainfall respectively. Regarding temperature, the majority of respondents witnessed an increase, while 0.8% experienced no change and unstable temperature. No one, however, thought

46

the temperature was dropping (Mensah, 2018). About a quarter (25%) of the populace lacks access to safe drinking water, and decreased precipitation, drought, and increasing temperatures are putting a load on limited water supplies (USAID, 2017). Aside from the negative ramifications, climate change leaves a huge debt on vulnerable countries. For example, flooding costs have been allocated to a variety of incidents, including hurricanes Katrina, Rita, and Wilma costing more than $180 billion in 2005. The latest Atlantic hurricanes in 2017 are predicted to have cost the United States more than $230 billion (Trenberth, 2018). Owing to climatic fluctuations and overfishing, Ghana is forced to spend more than $200 million per year on seafood imports to meet local consumption (USAID, 2017).

Climate Change Communication Barriers to Public Understanding

Sparse literature exists in terms of how communication barriers/challenges affect the public understanding and uptake of climate information. A more recent community-level empirical study in Africa is provided by Antwi-Agyei et al. (2021) who discovered that in West Africa, many socioeconomic and cultural constraints continue to obstruct the effective use of climate information. Insufficient data on weather conditions, projections for future preparation, limited availability of climatic data, lack of education, dearth of consciousness of climatic change, timely delivery of climate prediction, loss of trust in climatic data, as well as an imbalance between information provided and what is needed are some major impediments to small-scale farmers' ability to effectively use climatic data to improve their adaptive capabilities (Antwi-Agyei et al., 2021).

47

Demographic Factors and Climate Change Perceptions

Location

Individuals and societies benefit greatly from access to information. However, not all communities have equal access to information. Many individuals, especially those living in rich urban communities, are accessible to a wealth of knowledge. Individuals in disadvantaged areas, on the contrary, are routinely deprived of accessibility to the knowledge they require to better their circumstances. In remote regions of most emerging nations, the situation is extremely dire (Mahl et al., 2020; Ndinde & Kadodo, 2014; Selormey et al., 2019).

Socioeconomic Status

The impact of household wealth on people's behaviours around climate change has been demonstrated several times (Mahl et al., 2020). Low-income people are less concerned about global warming and are less conscious of it (Metag et al., 2017; Murphy & Tinga, 2019). A study has indicated that an association exists between household income and climate change awareness (Kabir et al., 2016).

Education

Education is critical to public knowledge of climate change (Onyekuru & Marchant, 2017). Across 119 nations, education is the most powerful determinant of global warming consciousness (Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015). For example, among 21% Ghanaians that are considered climate change literate, this proportion is among the youth with secondary and post-secondary

48

education (Selormey et al., 2019). Kabir et al. (2016), disclosed that household heads with higher education were found to be more aware of climate change than those with lower education.

Gender

Climate change influences males and females disproportionately (EPA, 2018). This is owing to gender disparities in economic, political, and social possibilities, such as formal work, finance and technology access, education, and civic involvement (EPA, 2018). In their attitudes, understanding, and interest in the environment, men and women vary (Shi et al., 2016). Females are more worried about global warming than males, according to research conducted in Germany and the United Kingdom (Shi et al., 2016). Men and women have opposing views on global warming, according to Haq and Ahmed (2017). More men than women think global warming is caused by humans, but more women feel climate change is both God's will and retribution for immoral behaviour.

Age

Age similarly influences audience's comprehension of global warming and readiness to respond. Americans aged 18 to 35 were less worried and involved with global warming than their elders, but they were likely to assume that people drive global warming and that there is scholarly unanimity on the issue (Feldman et al., 2010). Seager's (2008) study in South Africa, which Mahl et al. (2020) acknowledged, found that younger South Africans often claimed they were more knowledgeable about global warming than older persons. Kabir et al. (2016) revealed that elderly individuals are more worried about ecological problems than

49

youngsters. Furthermore, a survey found that younger individuals are more worried about global warming than middle-aged and older adults. Similarly, middle-aged adults are more likely than youngsters or older persons to assume that climate change is the consequence of sinful behaviour (Haq & Ahmed, 2017).

Marital status

Numerous research support the notion that marital status has a significant impact on ecological concerns and global warming beliefs, but few have looked at the difference between married and unmarried persons (Addisu et al. 2016; Asekun-Olarinmoye et al. 2014; Kim & Moon, 2012; Swai et al., 2012). Swai et al. (2012) found that individuals' perceptions of dryness differed depending on their marital status, but they did not distinguish between couple and single people. According to Asekun-Olarinmoye et al. (2014) and Addisu et al. (2016), the state of married life significantly affects perceptions of climate change. Kim and Moon (2012) ascertained that couples, rather than unmarried individuals, engage in preemptive ecological activities such as conserving water and purchasing energy-efficient light bulbs.

Communication Barriers as Adaptation Constraints

One of the most difficult parts of adjustment mechanisms, especially in emerging countries, is the presence, exposure to, and diffusion of information and expertise. In marginalised populations exposed to global warming impacts, a dearth of valid information might limit adaptive activities or possibly result in maladaptation (Ospina, 2011; Pickson, 2021). Larson (2019) concluded that a greater comprehension of what is most important for individuals and societies is

50

needed if we are to adapt in a way that protects what we care about most. Farmers' exposure to climate data has a lot of opportunities for helping them make better judgements, reduce the hazard, take the opportunity of pleasant weather, and adjust to changes (Zakari et al., 2022). Furthermore, supplying timely meteorological data is critical for successfully assisting agricultural households in their adaptation to climatic changes (Pickson, 2021). Nevertheless, knowing is not sufficient; it also has to be turned into meaningful advisories, with good messaging methods and education to comprehend and apply it (Zakari et al., 2022).

Another study concluded that the inefficient transfer of meteorological messages between the Metrological Services Department and MOFA before getting to peasants, and insufficient weather information were viewed as a severe worry (Fagariba et al., 2018). In comparison to educated farmers, less educated and non-educated farmers have a lower inclination to adjust to technologically oriented techniques in resolving the repercussions of climate change, according to that study. Since a majority of farmers in the research region are non-educated, they favour basic adjustment methods to minimise any unpredictability, which limits their adaptation alternatives (Fagariba et al., 2018). In the aftermath of growing climatic consequences, rural people in Ghana have depended heavily on indigenous wisdom to conserve resources that sustain their lives. Indigenous knowledge has strengthened traditional adaptation strategies at the local level, but it has not had the desired influence in regarding climate change resilience. Consequently, during periods of extreme effects, damage to assets, and loss of

lives have been severely high. The fundamental rationale for this is that the use of native wisdom in the creation of local adaptation strategies continues to be scattered, and unrecorded (UNEP & UNDP, 2013).

The review exercise has helped situate the present investigation in the larger body of literature. The literature has found a high level of climate change consciousnes but a limited public understanding of climate change. In the reviewed papers, the researchers prioritised quantitative method over the qualitative and therefore the arguments they presented are shallow. As a result, the review did not capture the comprehensive aspects of the issues due to the choice of methodology employed. In furtherance to the above shortfall, the current study coalesced both methods to bring out a detailed report on climate change issues so that the flaws could be compensated while leveraging their strengths (Creswell & Plano Clark, 2018; Ohene-Asante, 2015).

Summary of the Literature Review

Recently, studies of global warming perceptions as well as awareness have surged in climate change and other related disciplines. However, the review has established a trajectory where the majority of the publications have concentrated on farmers' views about climate change (eg. Alikhan, 2019; Ankrah, 2020; Mensah, 2018; Ogunbode et al., 2019; Pickson, 2021; Samuel et al., 2018; Sraku-Lartey et al., 2020). Only a few studies have considered students (Pelzer et al., 2017; Prasad, 2021), artisanal fisheries (eg. Hasan, 2015), and health professionals (eg. Hansen et al., 2014). Other research has investigated the views about global warming in general (Acquah, 2011; Crona et al., 2013; Leiserowitz, 2006; Yu et al., 2013).

52

Conclusion

While substantial literature exists on climate change communication and adaptation strategies globally, there remain notable gaps in the context of coastal Ghana. The existing literature primarily focuses on broader conceptual frameworks and theoretical underpinnings, often lacking empirical studies specific to the region. Moreover, the role of traditional knowledge and indigenous communication channels in augmenting climate resilience remains underexplored. Addressing these gaps is crucial for developing tailored communication interventions that resonate with the lived experiences and realities of coastal residents, thereby enhancing their adaptive capacity. Future research endeavours should prioritise participatory approaches, interdisciplinary collaborations, and localised case studies to advance the discourse on climate change communication for effective adaptation in coastal Ghana.
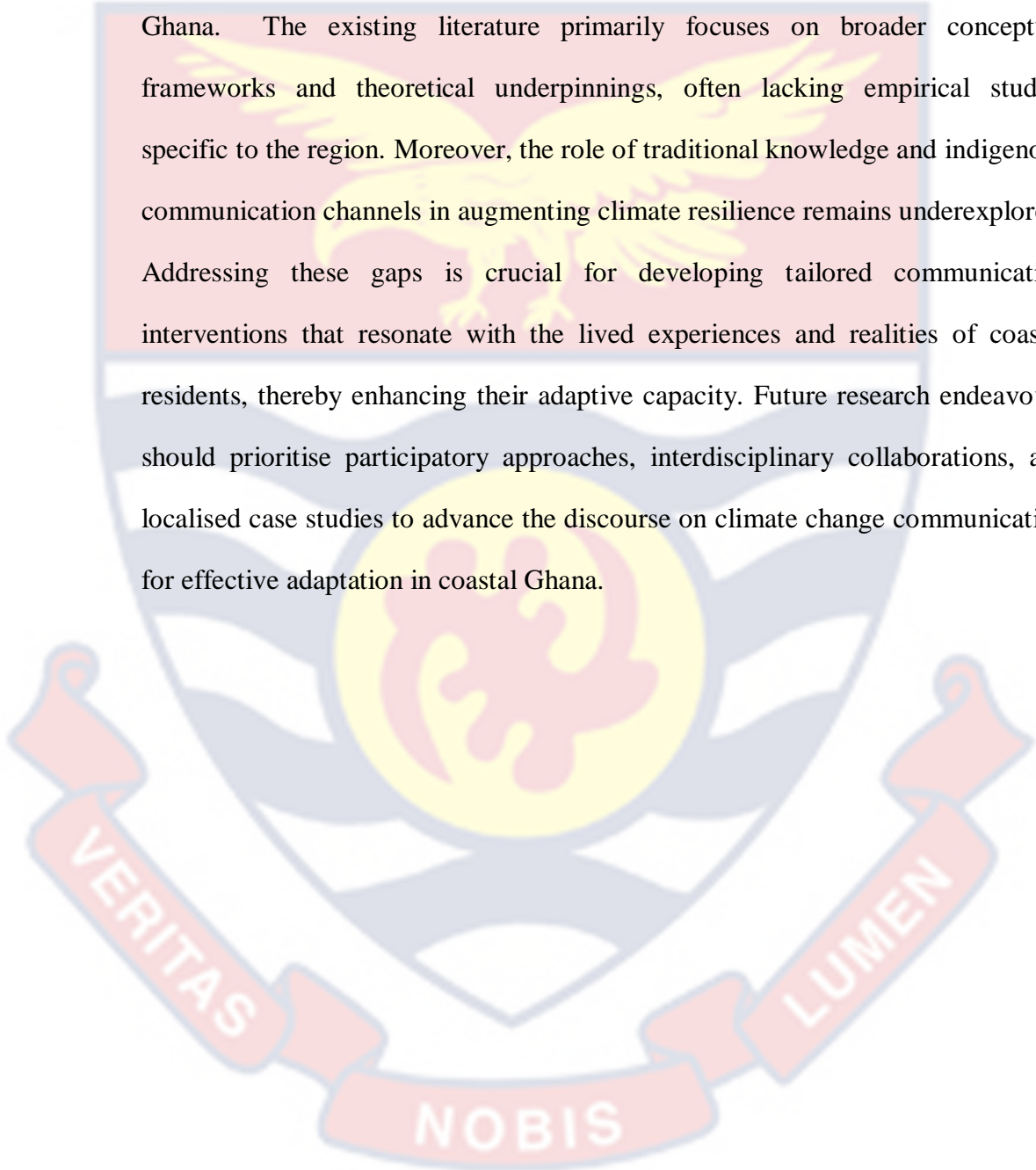
CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter epitomises the philosophical basis of the enquiry, the study plan, study location, population, sampling strategy, data collection methods, data, collection protocols, data processing, and analysis, as well as a chapter summary.

Research Paradigm

The enquiry was grounded in pragmatism paradigm. The choice for pragmatism paradigm is inherent in the advantages it gives to social science researchers. It promotes dialogue and collaborative understanding to develop effective solutions to societal challenges (Shannon-baker, 2016). Similarly, the pragmatic researcher can remain subjective in their research thoughts while collecting and analysing data objectively (Shannon-baker, 2016). Finally, pragmatism provides numerous avenues for bridging the gaps that occur in mixed methods strategies for social research (Shannon-baker, 2016). Biesta (2010) contends that knowledge can only provide us with information about the ramifications of our actions, not "once-and-for-all truths." Instead, pragmatism crosses the divide between constructivism and positivism to evaluate what is significant from each perspective (Biesta, 2010).

Research Design

The choice of pragmatic paradigm, therefore, dictates the adoption of a mixed-method approach (Subedi, 2016). A mixed-method study, merges numerical and textual research techniques (Johnson et al., 2007; Kroll & Morris,

54

2009). This approach was intended to provide a full description of the results since the mixed method compensates for the flaws of both methods while drawing on their strengths (Creswell & Plano Clark, 2018; Ohene-Asante, 2015). This study utilised a variety of tools (survey questionnaire, in-depth interview, and focus group discussion) to collect data. A convergent parallel or concurrent triangulation mixed-method design was chosen to achieve the study goals.

Generally, the concurrent triangulation was considered an appropriate method of examining the parallels and differences between the data obtained (Tenuche, 2018). The convergent design is a blended approach in which the investigator gathers and examines two distinct databases—textual and numerical—before merging the two datasets with the intention of comparing or consolidating the findings (Creswell & Plano Clark, 2018; Tenuche, 2018). The rationale for using this approach was to fully comprehend the current issue by gathering various but mutually reinforcing facts (Tenuche, 2018). Investigators can also benefit from triangulation since it provides a variety of information to elucidate distinct aspects of phenomena. It also helps to debunk scenarios where one dataset contradicts a theory proposed by another (Noble & Heale, 2019).

However, there are discrepancies between the constitutive paradigms that underlie quantitative and qualitative methodologies, preventing their combination. Some consider the MMR debate to have a profound post-positivist inclination, highlighting the propensity to prioritise quantitative above qualitative. Others claim that MMR plans are expensive, time-consuming, and need specialised knowledge of a variety of approaches. Still others claim that a simplistic methodological approach drives the desire for MMR (Creswell & Plano Clark,

2018; Dawadi et al., 2021; Denzin, 2010, 2012; Kroll & Morris, 2009; Nigel & Dan, 2017).

Study Area

The research was carried out in Anlo Beach in the Shama District, Akwidaa in the Ahanta West District (both in the Western Region), and Ampenyi in the Komenda Edina Eguafo Abirem District, Gomoa Fetteh in the Gomoa East District (both in the Central Region of Ghana). These communities have almost similar characteristics: they are fishing communities located between two bodies of water. Anlo Beach is located at the Pra River estuary, Akwidaa at the Ezile River estuary, and Ampenyi is situated at the Brenu lagoon. Gomoa Fetteh is an exception, only bounded by the sea.
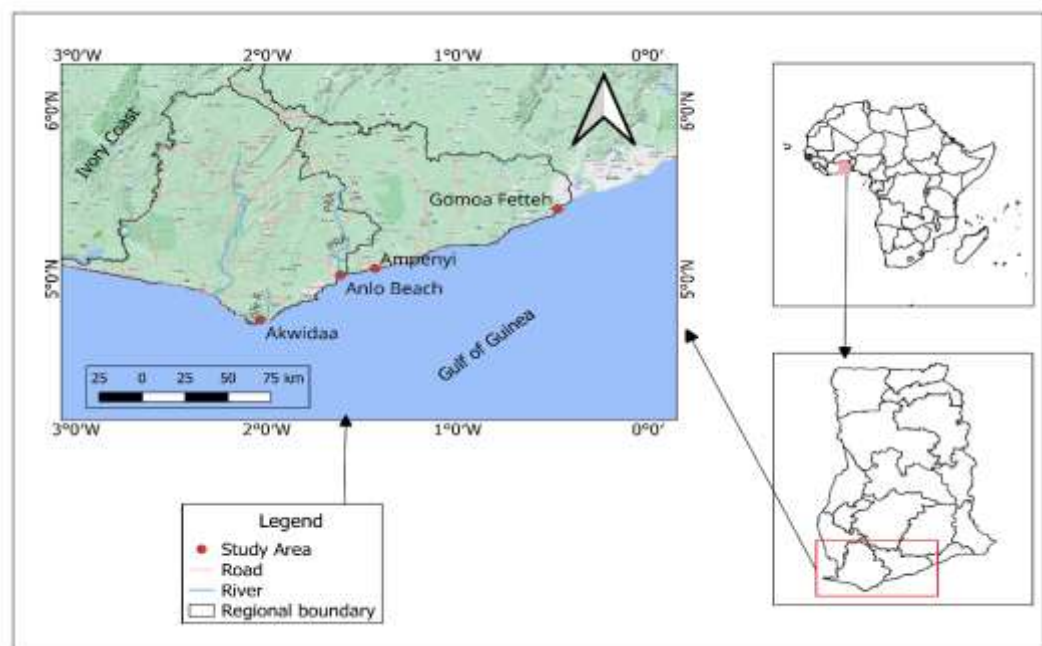
Figure 3: Study area map showing the four sampling sites of Akwidaa, and Anlo Beach in the Western Region, and Gomoa Fetteh and Ampenyi in the Rentral Region of Ghana
Source: Author's construct (2022)

56

Population

The residents of the four coastal communities were the study's target population. Presently, the total population of the four coastal communities is about 24855 people, with Anlo Beach having 4500 people (Mutimukuru-Maravanyika et al., 2017), Akwidaa, 8355 people (Sekyi, 2021), Ampenyi, 4000 people (Kosa Beach Resort, 2021) and Gomoa Fetteh, having 8,012 people, according to the Assemblyman during the reconnaissance survey.

Sampling and Sampling Procedure

Quantitative Phase

The enquiry employed a multi-stage selection strategy. Firstly, purposive sampling method was employed to choose two of the four coastal regions. Secondly, the purposive sampling was utilised to choose four coastal communities due to their distinct qualities. These communities were purposely selected because they are very vulnerable to the impact of climate change and variability. The locations of these communities along the coast subject them to coastal inundations. Climate change impacts such as sea level rise that drives coastal flooding, coastal erosion, and storm surges are common in these communities, with Akwidaa and Anlo Beach impacted heavily. In addition to being located along the coast, these communities have poor road networks limiting access to information especially climate change information and therefore, needed to be studied. Access to information is worsened by the poor telecommunication network in the areas. In terms of education, these communities have high level of

adult illiteracy, making it difficult to understand information when communicated in the English language.

The purposive selection also considered convenience in terms of geographical location, proximity and availability of time and resources, so that the researcher could reach all the respondents.The respondents from the four communities were chosen using the systematic sampling approach. From the study population, one respondent was selected and then the interval size for drawing successive respondents was calculated according to Alvi, 2016; Etikan, 2017; Showkat & Parveen, 2017; Taherdoost, 2016. This strategic approach of selecting respondents at regular intervals from a comprehensive list minimised the potential for bias and enabled a more comprehensive understanding of the target population's perspectives and experiences. This sampling technique helped to cover a wider population to ensure a representative sample (Kothari, 2004). The execution of the technique is less costly and convenient to use in case of a larger population by choosing every "nth" participant from a complete list (Etikan, 2017; Showkat & Parveen, 2017).

Qualitative Phase

In the qualitative phase, both purposive and convenience sampling approaches were deployed in choosing the research participants. The purposive selection was employed in choosing the participants for the in-depth interviews whereas the convenience selection technique was deployed to choose the participants for the focus group discussions. The selection criteria included knowledge of the local weather, accessibility, willingness to participate, and the

58

ability to provide rich and nuanced information on the research topic. In addition to providing deeper details into the individuals' experiences, textual data also enables a broader knowledge of how they perceived and assessed the information given about global warming and how it had a positive impact on their lives. The decision to choose the discussants was made in light of their desire to participate in the research and their knowledge of weather patterns and climate. The qualitative study was conducted on all the research objectives to determine the point of convergence or divergence and to provide detailed descriptions of the quantitative study. In all, twenty in-depth interviews and eight focus group discussions consisting of people believed to have knowledge on the climate were conducted. Five participants and two focus groups were pooled from each study site. The interviews and focus group discussions were held along gender lines with males and females grouped separately in order to avoid male dominance.

Sample Size

Quantitative Phase

The sample size for the quantitative study consisted of 420 drawn proportionally from four coastal communities. With a combined population of 24855, Yamane's formula becomes relevant.

The formula is given as $\mathbf{n_0} = \frac{N}{1+N(e)^2}$ …………………..(1)

where (N) is the total population size and (e) is the precision level. The study is set at a 95% confidence level and at that level, the level of precision (e) is ±5%, (e) is 0.05.

From the formula, $n_o = \frac{24855}{1+24855(0.05)^2}$ = 394 respondents. 26 more were added to

394 to a total of 420 to deal with more nonresponses that might occur. Therefore:

Anlo Beach by proportion $= \frac{4500}{24855} \times 420$ = 76 respondents.

Akwidaa by proportion $= \frac{8355}{24855} \times 420$ = 141 respondents

Ampenyi by proportion $= \frac{4000}{24855} \times 420$ = 68 respondents

Gomoa Fetteh by proportion $= \frac{8012}{24855} \times 420$ = 135 respondents

Table 1: Selected communities and the respective number of respondents used for this study

Community	Sample Size
Anlo Beach	76
Akwidaa	141
Ampenyi	68
Gomoa Fetteh	135
Total	**420**

Source: The Author (2022)

Qualitative Phase

In the qualitative study, twenty (20) in-depth interviews were held. Five participants were selected in each of the four study communities. In addition, eight (8) focus group discussions, two (2) each from the study sites were also conducted. The focus group was made up of eight to ten members. In the group discussion, males and females were grouped separately to avoid gender influence and achieve parity in the discussion process.

60

Research Instruments

Quantitative Phase

The main instrument for the quantitative data was a pretested structured-interviewer-administered questionnaire and secondary data (rainfall and temperature) records from the Ghana Meteorological Agency. The secondary data helped the investigator to compare with respondents' perceptions of climatic variability/change and examine if the differences are associated with climate change in the study locations. The researcher developed the instruments based on a thorough literature review and a reconnaissance visit of the study communities. Every question in the survey was created with a specific objective in mind. The questionnaire were used to reach out to a huge number of respondents quickly and simultaneously, therefore, obtaining a diverse variety of data (Lois, 2014; Young, 2016). The questionnaire were administered with the assistance of qualified field assistants who speak the respondents' native language. The field assistants were provided orientation on the question items, data ethics, and how to use tablet to collect data. The survey sought data on the socio-demographic information of the respondents, and their knowledge, perceptions, and consciousness of climate change messaging. The survey made up of closed-ended questions and a few open-ended ones. Closed-ended surveys need respondents to tick suitably and rate items on a Likert scale from strongest to weakest, but open-ended questions permit them to insert answers (Igwenagu, 2017; Lois, 2014). The instrument was pre-tested at Kormantse in the Central Region with an overall reliability coefficient (alpha) of 0.72. The pre-test enabled the investigator to check the

61

robustness of the question items and to refine the final instrument. Questions that were ambiguously framed were revisited and reworded, seemingly difficult questions were reframed into simple and manageable ones, and new questions were introduced based on issues some respondents raised during the pilot. The overall questionnaire was restructured after the testing.

Qualitative Phase

A detailed description of information was sought from focus group discussions and in-depth interviews. The researcher prepared a discussion and interview guides to collect the qualitative data. The questions and their prompts were open-ended and were geared towards the research objectives to determine the points of convergence or divergence within the two data sets. The open-ended questions gave the participants enough latitudes to express their views about climate change and its communication. The data were recorded using Samsung A7 Lite Tablet after approval had been given by the participants.

Data Collection Procedure

Secondary data were collected from Ghana Meteorological Agency. The researcher, with the help of the field assistants, collected primary data from July to August 2022. These assistants were briefed and trained on how to collect data before actual data collection took place. During the data collection, the investigator briefed respondents on the study and allowed them to fill and sign the informed consent form that he had prepared. The investigator asked questions based on the research objectives. In-depth interviews consisting of people considered to have knowledge about the climate, was conducted. They consisted

of diverse people including assemblymen, chief fishermen and fishmongers, unit committee members, teachers and headmasters and other persons with knowledge and experience of the weather. Focus group discussions of groups between eight to ten members made up of males and females were also conducted according to the objectives of research. The researcher obtained consent before recording the proceedings of the interviews as well. This was preceded by a sample of consent sheet asking for the participant's involvement in the investigation and indicating that the participants would not be identified if they did not want to. Challenges met ranges from resentment from respondents to difficulty in translating questions to respondents' native tongue.

Ethical Considerations

Confidentiality, informed permission, anonymity, persuasion, coercion, and language were some ethical problems to think about in the study. Ethical clearance was obtained from the university's Institutional Review Board. An introduction to the instruments clarified the survey's objective, the researcher's identity, and the institution where the study was conducted. The survey allowed respondents to participate voluntarily. There was no consequence if individuals opted to cease participating at any point. All information acquired for this study was kept private and was never linked to their names. All responses to a question were combined to create a summary of any findings. The language was carefully chosen to prevent offending, distressing, or humiliating people. There was no technical or scientific jargon in the question-wording. The field assistants recruited from the communities translated the questions into the native language

of the respondents. To ensure the accuracy of translations into the respondents' native language, the translations were back-translated into English by third parties who understand the English language, and are also natives of the study sites for the researcher to be fully sure of the exact meaning of the questions he intends to pose. Finally, to ensure peace and respect for both respondents and community leaders, the community's code and behaviour were carefully followed.

Data Validation, Processing and Analysis

Quantitative Data

The questionnaire was cross-checked for all necessary corrections to be made before being coded serially. Preliminary analyses were undertaken to make sure all assumptions were met before the actual analysis was done. The data was analysed using SPSS version 25 and excel 2019. For Objective 1, frequency tables, charts, and cross-tabulation with chi-square testing were largely deployed. The Chi-square test assessed the association between variables. The results obtained from these tests were therefore triangulated with secondary data that were obtained from the Ghana Metrological Agency. Objective 2 was addressed using a binary logistic regression model to predict changes in probabilities of the explanatory variables on the dependent variables. Objective 3 was achieved with descriptive statistics (frequency tables and charts) to depict the distribution across the population. Detailed descriptions through thematic analyses generated from focused group discussions and in-depth interviews were mainly used to address Objective 4. The final objective was achieved using descriptive statistics

64

(frequency) to show respondents' views on how to improve climate change communication to facilitate effective adaptation.

Qualitative Data

The qualitative data was analysed using thematic analysis following the protocol outlined by Braun et al. (2016); Braun and Clarke (2006); Herzog et al. (2019). Thematic analysis is a technique for recognising, examining, and summarising patterns (themes) in textual data (Braun et al., 2016; Braun & Clarke, 2006). The protocol involves six steps: '(1) familiarisation with the data, (2) generation of initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) writing the report' (Braun et al., 2016; Herzog et al., 2019). The audio data was first transcribed using Microsoft Word. The raw data were read several times to be aquainted with them and to determine the pattern within the data. Despite being tedious, time-consuming, and perhaps monotonous, transcription can be a great approach to begin getting acquainted with the material. Initial codes were generated after the familiarisation process. Data segments that are perhaps related to the study's objectives are given designations known as codes (s) (Braun et al., 2016; Herzog et al., 2019). Coding reduces vast volumes of data into manageable, insightful pieces (Maguire & Delahunt, 2017). The complete data set were grouped into relevant categories during this stage (Herzog et al., 2019).

The investigator was interested in answering particular study objectives and analysed the information accordingly, hence this was a theoretical thematic analysis rather than an inductive one. Using open coding, the researcher coded each segment of data that was relevant to the research objective. This was

65

achieved by developing and modifying the codes as the coding process continued. Using the constant comparative method, the researcher went back and forth among transcripts until categories consistently emerged. Similar codes that overlapped were merged together as single codes. For example, codes like "no education", "did not go to school", "only primary three", were merged as lack of education. "I can only speak Fanti", "I don't understand English", "not speaking in our local language", were also coalesced as language barrier. The next protocol in the thematic analysis involves searching for themes. According to Braun and Clarke (2006), what makes a theme is not subject to any strict guidelines. A theme is defined by its importance (Maguire & Delahunt, 2017). The codes had been arranged at this point into more general themes that appeared to be speaking specifically to the objectives (Maguire & Delahunt, 2017). The investigator carefully searched for relevant themes that captured the research objectives. The next phase after appropriate themes are arrived at is the review of the themes. This concerns with the step from developing provisional or candidate themes into final themes (Braun & Clarke, 2006; Herzog et al., 2019). Here, you develop and improve a prototype thematic map. The researcher compiled all the information pertinent to each theme (Maguire & Delahunt, 2017). The overarching goal of the review stage is to ensure that the themes and sub-themes appropriately reflect the data set (Herzog et al., 2019). Phase five of the thematic analysis is to define and name themes. In this stage, the investigator clarifies the meaning of each label and the information it contains (Braun & Clarke, 2006; Herzog et al., 2019). The themes were finalised after the renaming had led to satisfactory results (Herzog et al., 2019). In the present research, the themes' designations are brief, direct, and quickly convey to the reader what the theme is about (Braun et al., 2016; Braun &

Clarke, 2006). Ultimately, finalising the patterns was a tedious task but the investigator committed adequate time and attention (Herzog et al., 2019). The last stage of thematic analysis is the creation of reports. This entails explaining the nuanced narrative of your facts in a manner that persuades the audience of the value and accuracy of your research (Braun & Clarke, 2006).

The write-up went beyond merely presenting the information. Excerpts were incorporated into an analytical narration that convincingly demonstrated the story the investigator was telling about the data. The analytical narratives went further than a simple summary of the facts to present a claim in response to the survey questions (Braun & Clarke, 2006; Herzog et al., 2019). These data excerpts as interview and discussion comments best represented a specific trend that arose from the investigation (Herzog et al., 2019). In the main write-up, such extracts were italicised and in quotation marks as direct voice from the participants. The purpose was to provide different but mutually reinforcing data to proffer a detailed analysis of the research problems. The methodology of the enquiry has been summarised below with the framework in Figure 4, which provided the specific activities undertook during the research process in order to arrive at the overall study.
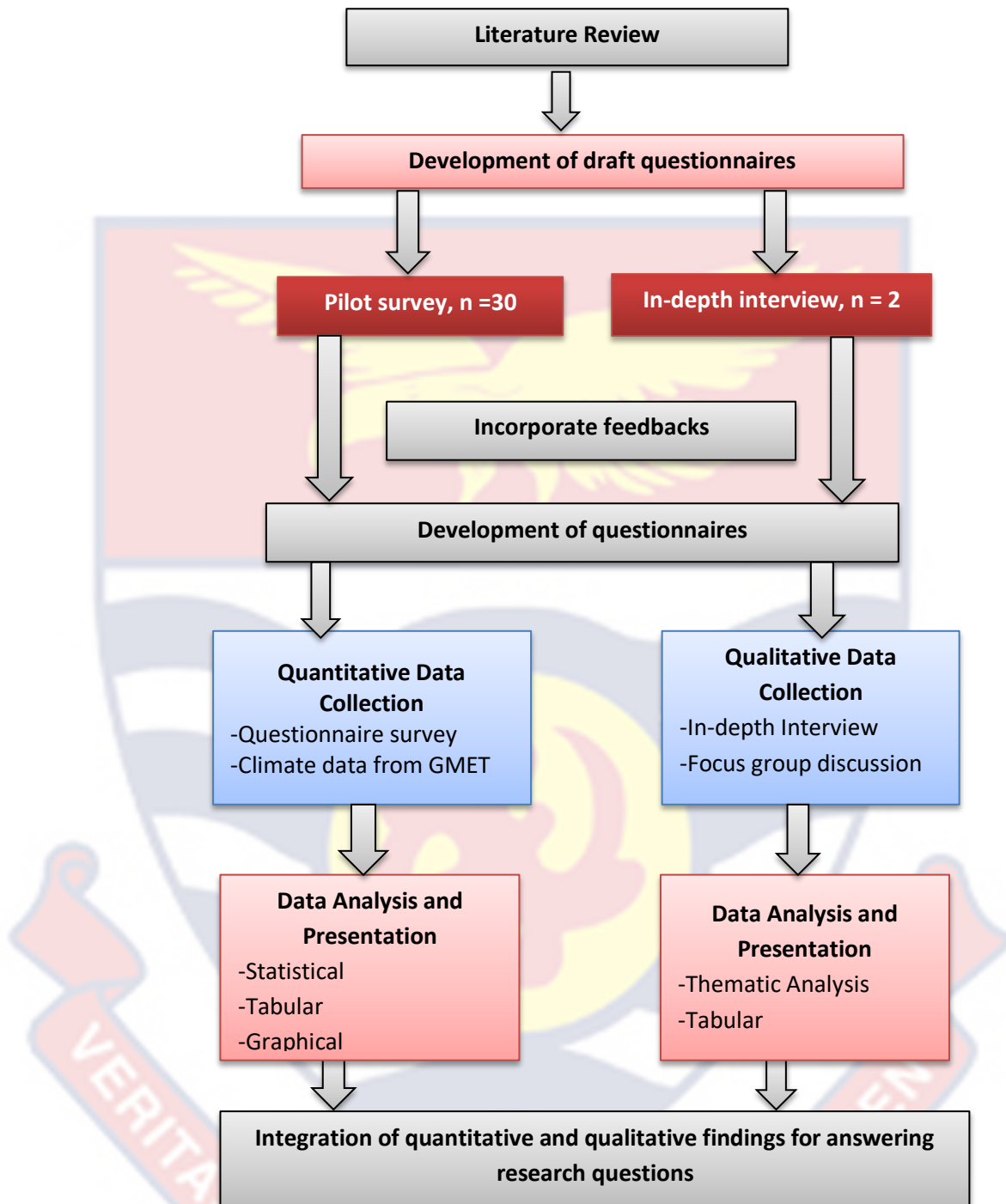
GMET- Ghana Meteorological Agency

Figure 4: Model of research design, data collection and analysis method used for this study

Source: Author's construct (2022)

Chapter Summary

Underpinned by pragmatism paradigm, the enquiry chose the convergent or concurrent triangulation mixed-method design, with a sample size of 420, proportionally drawn from the four coastal communities. Questionnaire was used to collect the quantitative data whereas in-depth interviews and focus group discussion were used for the qualitative data. In addition to these data, secondary data consisting of rainfall and temperature were obtained from the Ghana Meteorological Agency. Statistics, both descriptive and inferential were employed analyse the numerical data whiles the textual data were analysed using thematic analysis by following the protocol of Braun et al. (2016); Braun & Clarke (2006); Herzog et al. (2019). Notwithstanding the study's progress, the investigator encountered significant difficulties. The researcher received disapproval from several individuals. Some residents believed that granting interviews was a waste of time because prior research in their villages had failed to produce real results. In addition, the interview approach chosen to gather data from the populations presented a challenge. The task of translating the questions into the respondents' native tongue and documenting their responses, which had to be translated from their native tongue into English, was onerous.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter is made up of two sections. The first presents the results of the study and the second examines the findings in relation to literature. In the report, the numerical and textual results are presented separately and merged in the discussion section to provide a solid understanding of the assessment of climate change communication strategies. The rationale was to avoid the repeated problem and criticism of subordinating QUAL to QUAN. This enquiry balances both data.

Quantitative Results

demographic characteristics

gender, age and length of years

The study included 420 respondents out of which 5 were without valid data and so were not included in the analysis. This accounted for a questionnaire return rate of approximately 99%. A total of 415 respondents were therefore used in the analysis. Table 2 illustrates the spread of gender, age and length of years. In terms of gender, 205 (49%) females and 210 (51%) males participated in the study. The age groups show that 80 (19%) people were within the age bracket of 21-30 years, 124 (30%) within 31-40 years, 81 (20%) within 41-50 years, 63 (15%) within 51-60 years, and 67 (16%) within the age group of 60 and above years old. This indicates that the age bracket of 31-40 (124) constituted the largest number of respondents with 30%. In terms of length of years stayed in the

community, awareness is highest among those who have lived in the community within 21-40 years and least for those who have stayed for <5 years.

Table 2: Respondents' gender, age, and years stayed in the coastal

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	210	51
	Female	205	49
	Total	**415**	**100**
Age	21-30	80	19
	31-40	124	30
	41-50	81	20
	51-60	63	15
	60+	67	16
	Total	**415**	**100**
Length of years	< 5	11	3
	5-20	75	18
	21-40	218	52
	> 40	111	27
	Total	**415**	**100**

Source: Field survey (2022)

marital status and educational level

The marital status was categorised into five namely, single, married, divorced, separated and widowed. A look at the data shows that 69 people (17%) were single, 33 (8%) were divorced, 19 (5%) separated, 42 (10%) widowed, and 252 (61%) married, which accounted for the majority of the respondents. Regarding respondents' level of education, it is clear from Table 3 that those with no formal education and primary education were the highest with 152 (37%) and

71

117 (28%) respectively. 86 people (21%) had middle school certificates, 48 (12%) with secondary school education, 8 (2%) with university education, and 4 (1%) with college of education.

Table 3: Marital status and educational level of respondents used for this study

Variable	Category	Frequency (N)	Percentage (%)
Marital status	Single	69	17
	Married	252	61
	Divorced	33	8
	Separated	19	5
	Widowed	42	10
	Total	**415**	**100**
Educational Level	No formal education	152	37
	Primary education	117	28
	Middle school	86	21
	Secondary education	48	12
	College education	4	1
	University education	8	2
	Total	**415**	**100**

Source: Field survey (2022)

religion and occupation

With regards to religion, the majority of the respondents with a population of 298 (72%) were Christians, 43 (10%) Muslims, 61 (15%) Traditionalists, 8 (2%) Atheists, and 4 (1%) as Others. The data, therefore, show that the study areas were predominantly Christian communities. In terms of participants' occupation, the data show that fishing and farming are two dominating

72

occupations in the selected communities with 108 (26%) and 94 (23%) respectively. In addition, 38 (9%) were into fish processing, 51 (12%) trading, 92 (22%) other occupations, and 30 (7%) with no job. The Other occupations consisted of several diverse occupations like teaching, driving, food sellers, carpenters, masons, just to mention but a few.

Table 4: Religion and occupational status of respondents used for this study

Variable	Category	Frequency (N)	Percentage (%)
Religion	Christian	298	72
	Muslim	44	11
	Traditional	61	15
	Atheist	8	2
	Other	4	1
	Total	**415**	**100**
Occupation	Fishing	108	26
	Farming	95	23
	Trading	52	13
	Fish processing	40	10
	Others	92	22
	No Job	28	7
	Total	**415**	**100**

Source: Field survey (2022)

73

Awareness and Perceptions of Climate Change

Respondents' Awareness of Climate Change

Out of the 415 respondents from the four selected coastal communities who responded to the questionnaire, 353 (85%) said they were conscious of climate change whereas 62 (15%) said they were not aware of climate change. A cross-tabulation between awareness and the demographic characteristics also depicts a high level of climate change awareness. The majority of the respondents in each selected community said they were aware of climate change. 130 (31%) out of 141(34%) in Akwidaa, 63 (15%) out of 76 (18%) in Anlo Beach, 59 (14%) out of 68 (16%) in Ampenyi, and 101 (24%) out of 130 (31%) in Gomoa Fetteh. Figure 5 shows awareness level and it clearly indicates that awareness is high among the selected coastal communities.
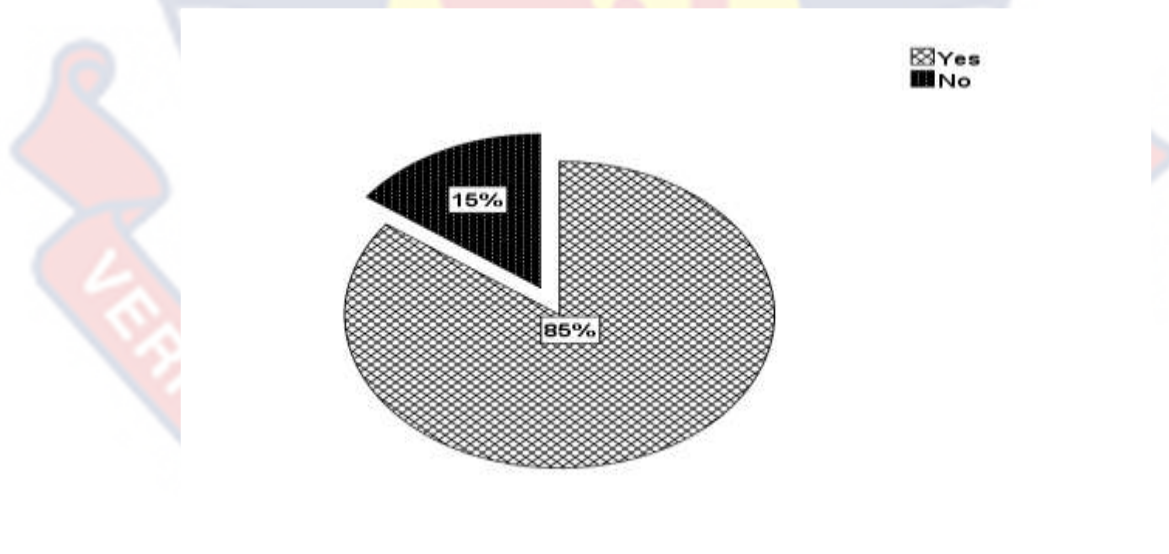
Figure 5: Awareness level of climate change among coastal communities used for this study

Source: Field Survey (2022)

Awareness by Demographic Characteristics

The study further disaggregated the data to find out awareness level per each demographic characteristic. The results show that there is greater level of consciousness among the study communities. In terms of marital status, awareness is highest among married people (61%) and lowest among the separated category (5%). The educational level showed a decreasing awareness trajectory with an increasing level of education with the highest awareness among those with no education (37%) and least among those with college education (1%). Awareness is highest among Christians (72%) and lowest among those with other religions (1%). Awareness is a little bit higher among males (51%) than the females (49%). In terms of occupation, awareness of climate change is highest among those in fishing (26%) and the least is among people with no job (7%). Awareness is also high among the youth in the age range (31-40 years) (30%) and lowest among individuals approaching the age of retirement (i.e. 51-60 years) (15%). Table 5 depicts awareness by demographic characteristics of the respondents.

Table 5: Cross-tabulation of awareness by demographic characteristics of respondents used for this study

Variable	Category	Awareness of CC		
		Yes	No	Total
Community	Akwidaa	130	11	141
	Anlo Beach	63	13	76
	Ampenyi	59	9	68
	Gomoa Fetteh	101	29	130
	Total	**353**	**62**	**415**
Marital Status	Single	51	18	69
	Married	226	26	252
	Divorced	23	10	33
	Separated	15	4	19

75

Table 5, continued

	Widowed	38	4	42
	Total	**353**	**62**	**415**
Educational Level	No formal Education	116	36	152
	Primary education	105	12	117
	Middle school	77	9	86
	Secondary education	43	5	48
	College education	4	0	4
	University education	8	0	8
	Total	**353**	**62**	**415**
Religion	Christian	264	34	298
	Muslim	30	14	44
	Traditional	51	10	61
	Atheist	7	1	8
	Other	1	3	4
	Total	**353**	**62**	**415**
Gender	Female	173	32	205
	Male	180	30	210
	Total	**353**	**62**	**415**
Occupation	Fishing	90	18	108
	Farming	80	15	95
	Fish processing	33	7	40
	Trading	47	5	52
	Others	83	9	92
	No job	20	8	28
	Total	**353**	**62**	**415**
Age	21-30	65	15	80
	31-40	110	14	124
	41-50	65	16	81
	51-60	52	11	63
	60+	61	6	67
	Total	**353**	**62**	**415**

Source: Field Survey (2022)

Means/Channels of Climate Change Awareness

The data solicited for sources of information from which respondents become aware of climate change. A multiple response set technique was used to analyse the data given that participants were permitted to select multiple answers and reported the frequencies and only the percent of cases. Out of a total of 415 respondents who responded to this question, 300 (72%) got their climate change information from mass media, 40 (10%) from social media, 57 (14%) from school, 106 (26%) from family members or relatives, and 45 (11%) from government officials. Conversation with people also contributes to climate change awareness creation with 131 (32%). Non-governmental organisations (NGOs) were named in the list as a channel for of climate change information with 23 (6%), and 72 (17%) from community information centres with 62 respondents representing 15% providing no answer. It is therefore evident from Figure 6 that the mass media constituted the major channel through which the respondents become aware of climate change and NGOs constituted the lowest means of climate change awareness. The mass media serve as the outlet of information to poor agrarian communities due to their extensive coverage.
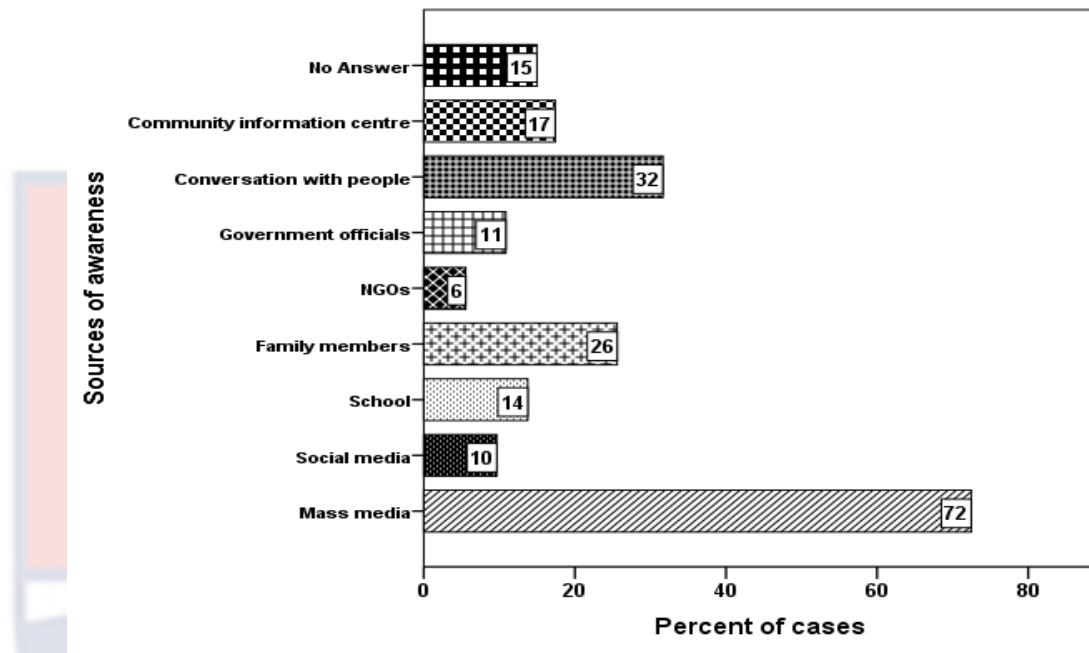
Figure 6: Sources of climate change awareness in selected coastal communities of Ghana
Source: Field Survey (2022)

Knowledge/Understanding of Climate Change

The survey tested respondents' knowledge or comprehension of climate change. Out of the sample of 415, 65% (270) claimed that they understood what climate change meant while 35% (145) said they did not have any knowledge or understanding of climate change. Figure 7 illustrates the respondents' understanding and/ or knowledge of climate change.

78

⊠Yes
▓ No
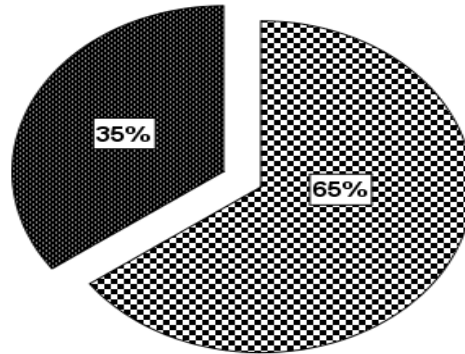
Figure 7: Knowledge of climate change among respondents of selected coastal communities of Ghana

*Source***:** Field Survey (2022)

Respondents' Perceptions of Causes of Climate Change

     The survey asked the respondents about the causes of climate change. Figure 8 depicts the respondents' perceptions of the causes of climate change. Out of 415 valid cases, 230 (55%) listed human activities, 92 (22%) named natural changes in the environment, 119 (29%) favoured both human activities and natural changes in the environment, and 228 (55%) said climate change is as an act of God, 150 (36%) think that climate change is the result of punishment for our sins, and 24 (6%) said none of the causes are applicable because climate change is not occurring.

79

Causes of climate change
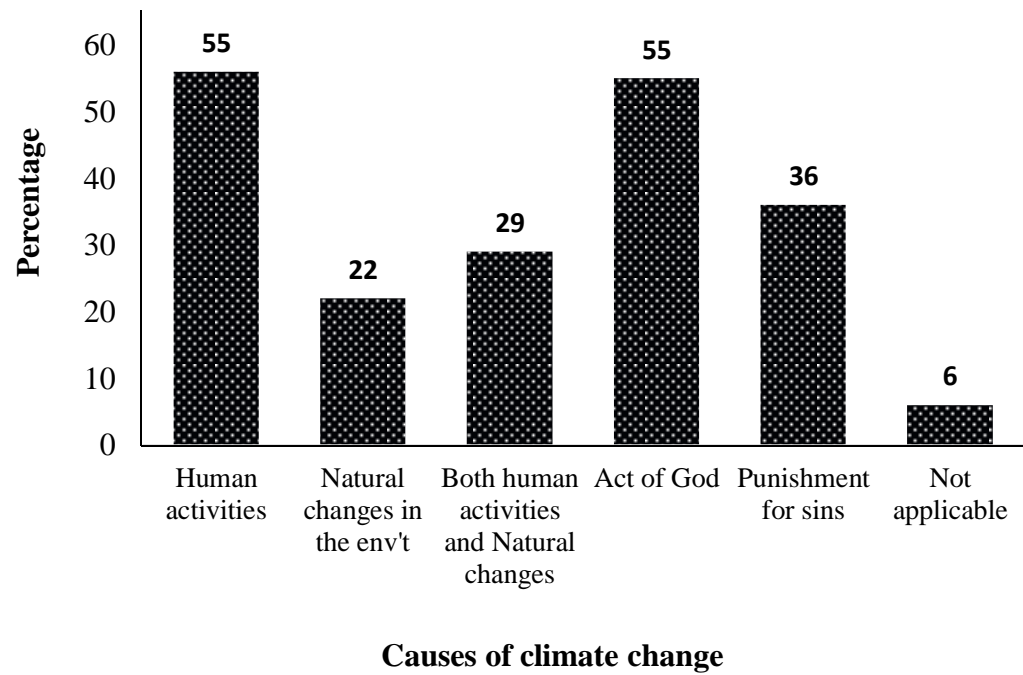
Figure 8: Perceptions of climate change causes among respondents of selected coastal communities of Ghana
Source: Field Survey (2022)

Signs/Impacts of Climate Change

The enquiry further sought participants' perceptions of climate change effects or the signs of climate change. All respondents answered this question. Out of the 415 respondents, 260 representing 63% selected rising temperature, 110 accounting for 27% selected erratic rainfall pattern, sea level rise was also named among the list with 177 responses representing 43%, flood and erosion was indicated by 146 of the responses accounting for 35%, 128 representing

80

31% selected heavy winds, 118 (28%) selected heat waves and 106 (26%) of respondents indicated all the above as signs of climate change. Figure 9 illustrate respondents' perceptions of signs of climate change.
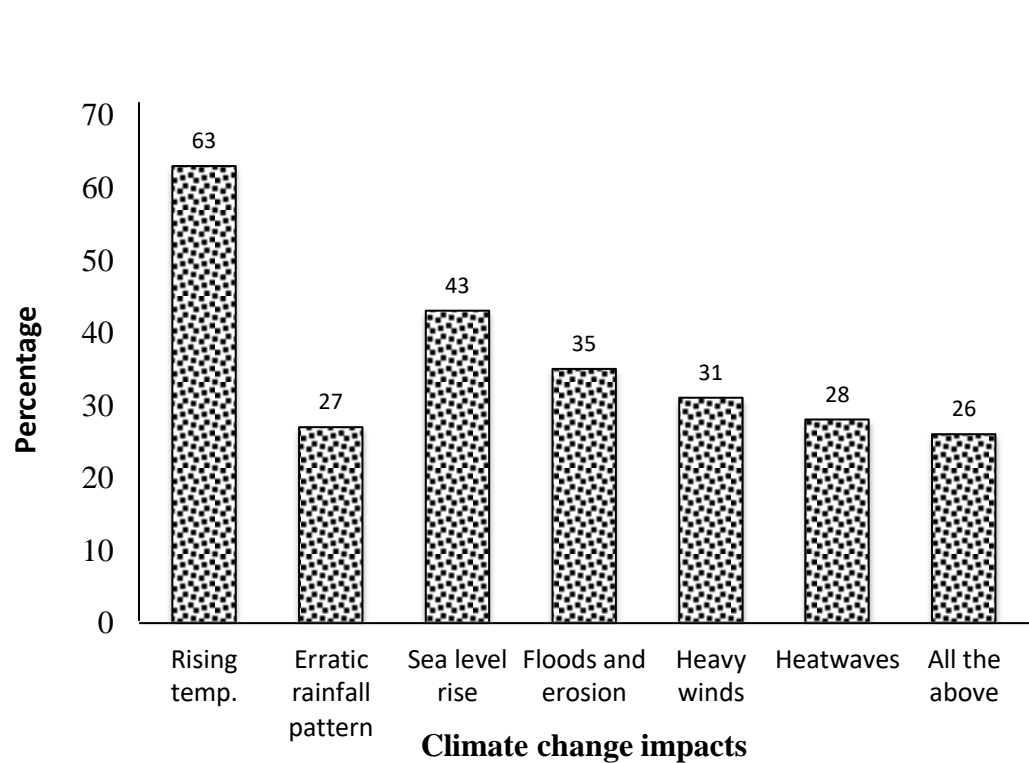
Figure 9: Perceptions of climate change impacts in the selected coastal communities in Ghana
Source: Field Survey (2022)

Respondents' Perceptions of Rainfall and Temperature

Rainfall

The survey sought the views of respondents on rainfall and temperature situations. The data show that participants believed precipitation to be increasing in Akwidaa and Anlo Beach but a decreasing rainfall in Ampenyi and Gomoa Fetteh. They claim that rainfall was higher in decades past compared to recently. Figure 10 below illustrates respondents' perceptions of rainfall.

81
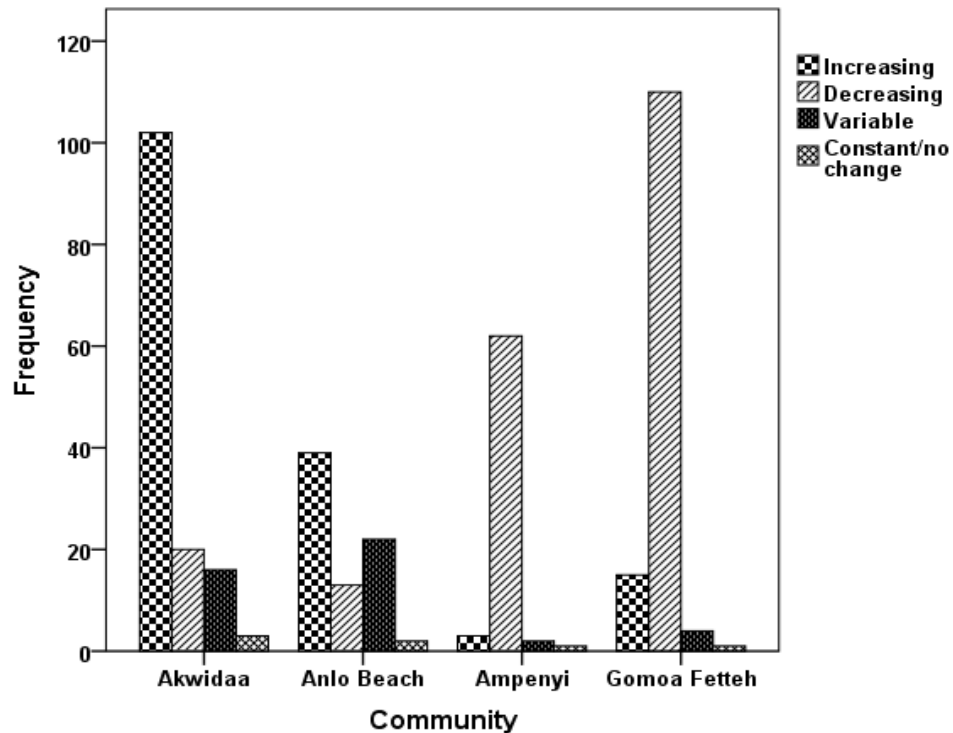
Figure 10: Perceptions of rainfall among respondents of the selected coastal communities in Ghana

Source: Field Survey (2022)

Trend Analysis of Rainfall

A trend analysis was performed on the rainfall data obtained from the Ghana Meteorological Agency and the data in Figure 11 shows that rainfall in all the areas increases initially in the first decade before they decline in 1998 despite minor fluctuations. From the latter part of 1999-2011, the rainfall fluctuates slightly until they drop again in all the areas with Ampenyi dropping markedly in 2012 and Akwidaa in 2013. Gomoa Fetteh and Anlo Beach also experienced a drop in rainfall in 2013 but slightly. From 2014, the fluctuations continue until 2019 except for Ampenyi which experienced a steady rise, and finally, all

82

declined in 2020 except Akwidaa rising. The analysis shows that rainfall declines in all the study areas except in Akwidaa. This is consistent with the majority of the respondents' views. The respondents from Akwidaa perceived an increasing rainfall and it agrees with the trend analysis. This could be possibly due to its location close to Axim, Ghana's forest zone where the highest rainfall is recorded. The respondents from the other communities perceived a decreasing rainfall and it is consistent with the trend analysis except in Anlo Beach where the respondents perceived an increasing rainfall but the analysis points to the opposite direction. This may be due to the difficulty of situating their perceptions in the last five years as the majority of them were influenced by last year and this year's rainfall in the area.
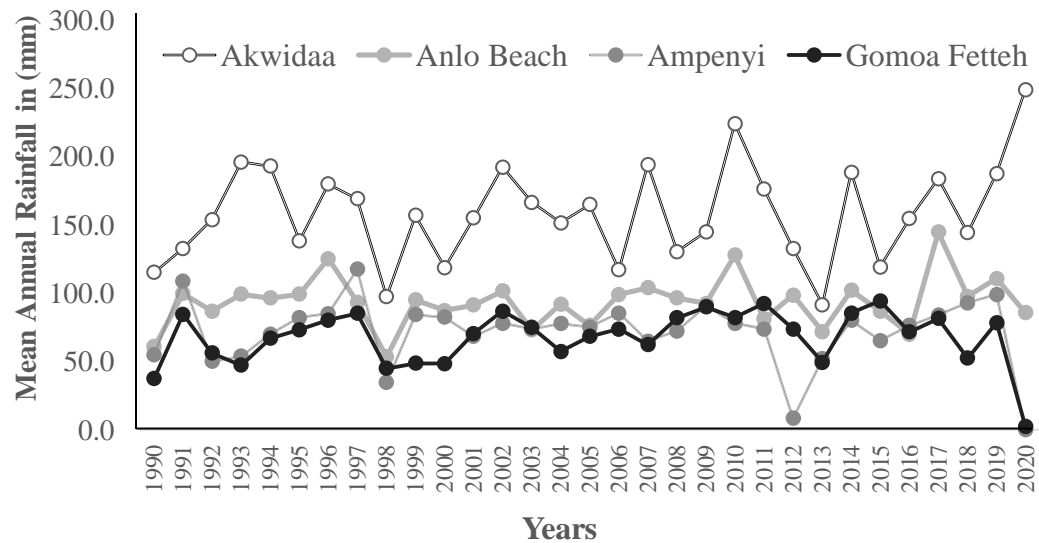
Figure 11: Trend analysis of rainfall of the four sampling locations

Source: Ghana Meteorological Agency, Accra (2022)

83

Temperature

In terms of temperature trend in the study areas, all the respondents perceived an increasing temperature trend. They acknowledged that temperature is high nowadays because of climate change which causes the sun to be very hot. This perception is in unanimity with the trend analysis in Figure 12. Temperatures increase in the first decade until they reach their peak in 1998. Temperatures begin to drop slightly from the latter part of 1998 to 2001. From early 2002 to 2019 temperatures in the study areas fluctuated and showed an upward trend again in 2020. The respondents acknowledged that the sun's rays are very hot nowadays when compared to the olden days. The reason ascribed to this rising temperature is the cutting down of trees. The trees, according to the participants, caused rains to fall and prevented the heat from the sun by providing shade and thereby reducing its intensity.
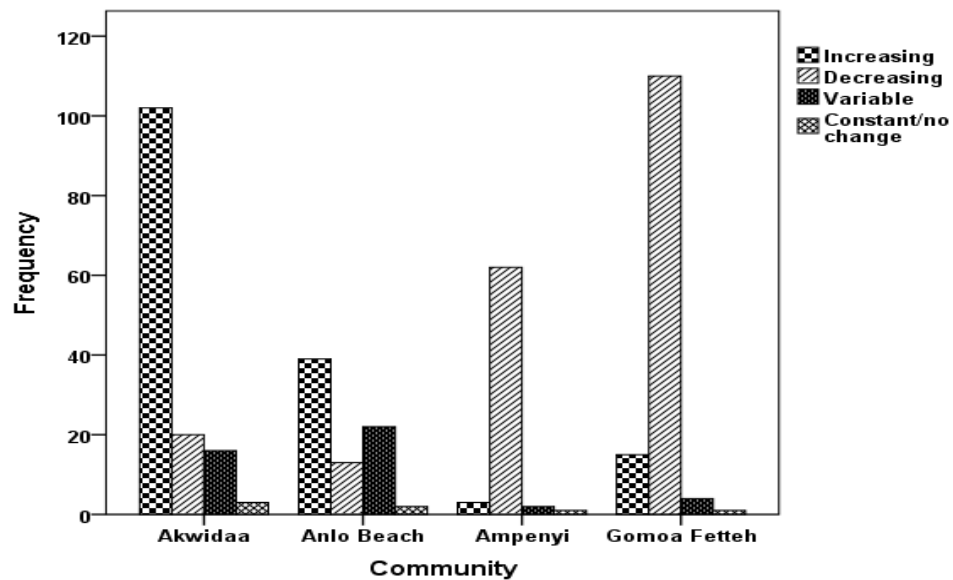
Figure 12: Perceptions of trend in temperature of the four sampling locations

*Source***:** Field Survey (2022)
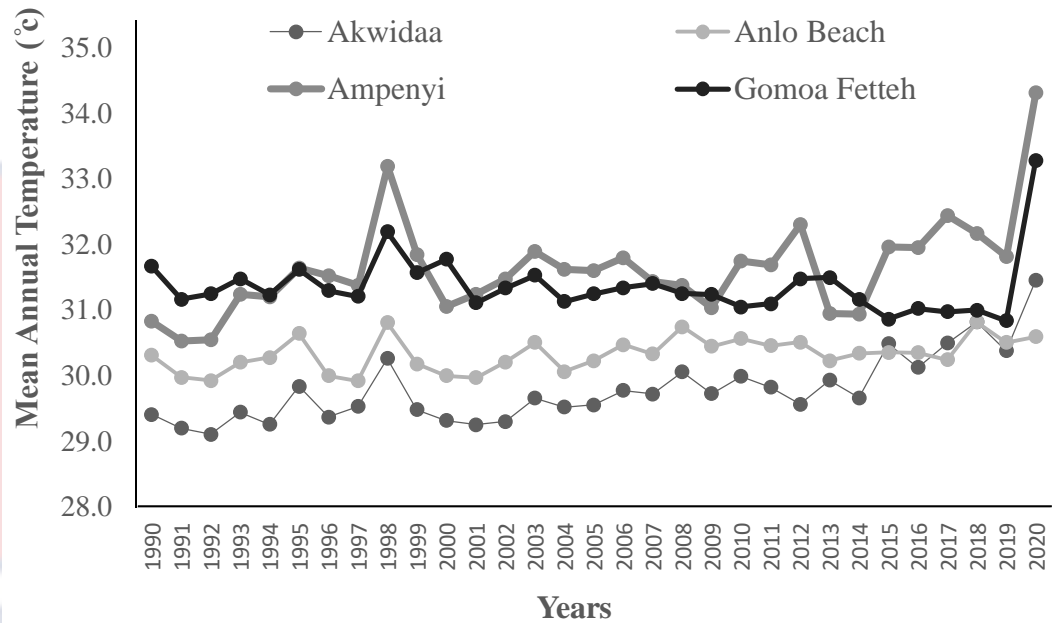
Figure 13: Trend analysis of temperature of the four sampling locations

Source: Ghana Meteorological Agency, Accra (2022)

Association Between Demographic Characteristics and Perceptions of

Climate Change Communication

The study tested for a link between respondents' demographic factors and their views about climate change dissemination. The dependent variable (perceptions of climate change communication) was measured on a dichotomous scale (effective or not effective). The binary logistic regression model was, therefore, chosen to achieve this objective. The basic logistic regression model is expressed as:

$$P_i = Prob\,(Y_i = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{1_i} + \ldots\ldots\beta_k Xk_i)}}$$

$$= \frac{e^{(\beta_0 + \beta_1 X_{1_i} + \ldots\ldots\beta_k Xk_i)}}{1 + e^{-(\beta_0 + \beta_1 X_{1_i} + \ldots\ldots\beta_k Xk_i)}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

85

Comparatively,

$P_i = Prob\ (Y_i = 0) = 1 - Prob\ (Y_i = 1)$

$$= \frac{1}{1 + e^{(\beta_0 + \beta_1 X_{1_i} + \ldots \ldots \beta_k X k_i)}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Dividing equation (1) by (2), we obtain

$$\frac{Prob\ (Yi=1)}{Prob\ (Yi=0)} = \frac{Pi}{1-Pi} = e^{(\beta_0 + \beta_1 X_{1_i} + \ldots \ldots \beta_k X k_i)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where Pi is the probability that Y assumes a value of 1 and (1-Pi) represents the likelihood that Y assumes a score of 0, and e is the exponential constant. Firstly, to ascertain the degree of the link between variables—positive or negative—as well as the connection between the outcome and the explanatory variables, Pearson correlation analysis was used. The independent variables employed included gender, age, marital status, educational level, religion, community, and length of years stayed in the community. The concept of multicollinearity was checked using the tolerance and the variance inflation factor.

The results showed that no tolerance above (10)—rule of thumb or (2.5) in weaker models such as this, existed among the variables, which showed that the variables utilised in the study did not have any significant multicollinearity. The model of best fit was determined using the Hosmer and Lemeshow Test of Goodness of fit, the Omnibus Test of Model Coefficients with a (Chi² = 102.264; df =23; and p =0.000) and the classification table with an overall accuracy of 73%. Following the regression, the goodness of fit calculated Chi² was statistically insignificant (p=.835) signifying that the data was well-fitted to the model. The dependent variable (perception of climate change communication categorised in its binary form) was regressed against the explanatory variables

86

mentioned above. The analysis shows that only the occupation and the community were significant in predicting the peoples' perception of climate change communication because at least one of the categories of those variables was statistically significant.

However, gender, age, marital status, education, religion, and length of years stayed in the community were not statistically significant. The odds of people involved in farming decreases by (-0.114) on average with an odd ratio (0.893) and the relationship was not significant (p>0.05) compared to those engage in fishing. Individuals engaged in trading have their odds of probability of falling into the target category increases by (1.785) with an odd ratio of (5.961) compared to those in fishing and the association is significant (p=0.001). The probability of the odds of individuals engaged in fish processing increased by (1.335) with an odd ratio of (3.801) on average, compared to those in fishing. The relationship is significant at (0.029). The odds of respondents involved in other occupation decreases by

(-0.244) on average with an odd ratio of (0.784) compared to those in fishing. The relationship was not significant (p>.05). The probability of individuals with no job increases by (0.700) with an odd ratio of (2.013) on average when compared to individuals in fishing. However, the association was not statistically significant at (0.05).

Finally, the probability of people living in Anlo Beach increases by (0.084) with an odd ratio of (1.087) on average compared to people in Akwidaa. Nonetheless, the relationship was not significant (p>0.05). Individuals living in Ampenyi have their odds of probability of falling into the target climate change

87

communication perception category decreased by -1.881 with an odd ratio (0.152) on average compared to individuals living in Akwidaa. The association was significant (p=0.000). The probability of people in Gomoa Fetteh falling into the target category of climate change communication perception decreases by (-0.142) with an odd ratio of (0.830) than individuals in Akwidaa. Notwithstanding, the relationship was still not statistically significant (p>0.05). The positive coefficients of the variables showed an increase in the probability of the event of the independent variables and the opposite is true for negative coefficients. The variables with p values less than 0.05 were significant in predicting people's perceptions of climate change communication.

Table 6: Multicollinearity test of variables used for this study

Variable	Collinearity Statistics	
	Tolerance	**VIF**
Gender	.788	1.270
Age	.542	1.845
Marital status	.663	1.508
Educational level	.873	1.146
Religion	.936	1.069
Occupation	.783	1.277
Community	.968	1.034
Length of years	.641	1.559

Source: Author's computation (2022)

Table 7: Parameter estimates of the binary logistic regression model on perception of climate change communication

Variable	B	S.E.	Wald	df	Sig	Exp(B)
Gender (Female)	-0.444	0.365	1.481	1	0.224	0.641
Age	-0.199	0.129	2.388	1	0.122	0.820
Married	-0.088	0.599	0.021	1	0.884	0.916
Separated	-0.295	0.476	0.383	1	0.536	0.745
Divorced	0.612	0.618	0.982	1	0.322	1.845
Widowed	0.065	0.748	0.008	1	0.931	1.067
Primary Edu	-2.275	1.224	3.452	1	0.063	0.103
Middle Sch	-1.762	1.213	2.111	1	0.146	0.172
Secondary Edu	-1.573	1.220	1.665	1	0.197	0.207
College Edu	-1.684	1.226	1.887	1	0.170	0.186
University Edu	-2.239	1.686	1.764	1	0.184	0.107
Muslim	2.085	1.416	2.169	1	0.141	8.042
Traditionalist	1.605	1.474	1.186	1	0.276	4.976
Atheist	2.219	1.427	2.417	1	0.120	9.196
Other	2.718	1.794	2.297	1	0.130	15.153
Farming	-0.114	0.555	0.042	1	0.838	0.893
Trading	1.785	0.560	10.167	1	0.001	5.961
Fish Processing	1.335	0.610	4.785	1	0.029	3.801
Others	-0.244	0.559	0.190	1	0.663	0.784
No job	0.700	0.529	1.753	1	0.186	2.013
Anlo Beach	0.084	0.359	0.054	1	0.816	1.087
Ampenyi	-1.881	0.475	15.677	1	0.000	0.152
Gomoa Fetteh	-0.187	0.385	0.235	1	0.628	0.830
Length of years	-0.142	0.209	0.463	1	0.496	0.867
Constant	1.790	2.103	0.724	1	0.395	5.990

Source: Field Survey (2022)

Barriers to Public Understanding of Climate Change Communication

The study also investigated factors that militate against the public's understanding of climate change messaging. It is evident from Figure 13 that the barriers identified by the respondents are Language barrier 112 (27%); Lack of

education 93 (22%); Lack of climate change information 46 (11%); Lack of attention to/interests in climate change information 40 (10%); Information overload 37 (9%); Problem of media channel 35 (8%); Mistrust in climate change information 27 (7%); and Access to technology 25 (6%)
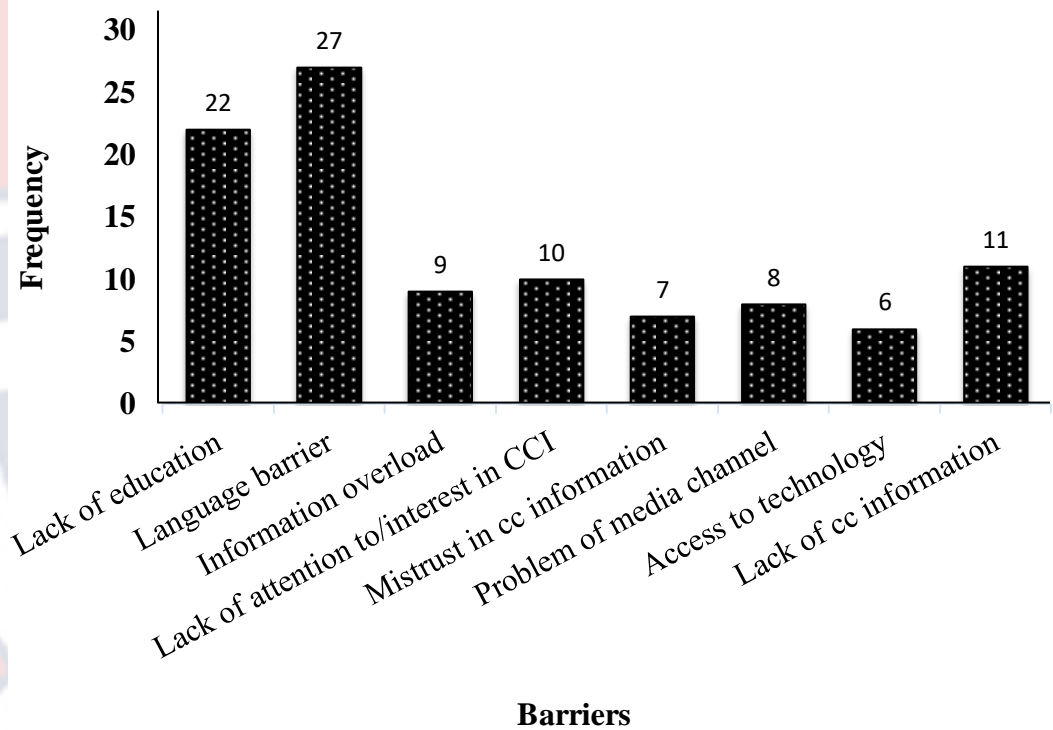
Figure 14: Barriers to public understanding of climate change messaging among respondents of the selected coastal communities in Ghana

Source: Field Survey (2022)

How to Improve Climate Change Communication for Effective Adaptation

The study's final objective sought to discover how climate change communication could be improved. Figure 14 depicts respondents' views about

90

what should be done to better climate change messaging to promote public understanding and engagement in climate change. The outcome revealed that 130 (31%) said local language should be used in communicating climate change; 73 (18%) suggested that there should be regular public education on climate change; 90 (22%) proposed the use of alternative channels for climate change communication; 37 (9%) submitted that climate change information should be accurate and delivered on time; and another 37 (9%) maintained that messengers or communicators of climate change must be trained; 16 (4%) suggested the introduction of climate change in school curricula; 22 (5%) theorised that climate change communication should highlight solution rather than always communicating the doom; and 10 (2%) who said they had no idea of what could be done to improve future climate change communication.
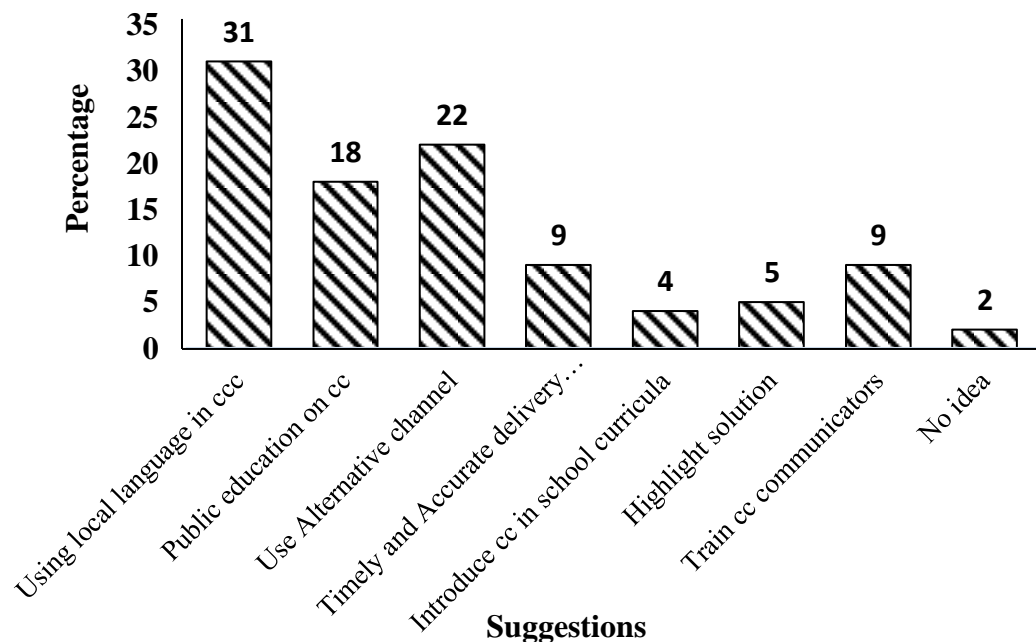
Figure 15: Ways of improving climate change communication by respondents of the selected coastal communities used for this study
Source: Field Survey (2022)

91

Relationship Between Religion and Perceptions of Climate Change Causes

The enquiry tested for an association between religious affiliation and respondents' views about the causes of climate change. The study found that there is a significant relationship between religion and causes of climate change. The relationship is statistically significant with (N = 415; $X^2 = 87.715$, df = 20, p-value of 0.000). Thus, we reject the null hypothesis in favour of the alternate that there is a statistically significant association between religious affiliations and people's perceptions of climate change causes.

Table 8: Association between religion and perceptions of climate change causes among coastal residents used for this study

Variable	Category	HA	NAT	HA & NAT	Acts of God	P of Sin	Not Appl.	Total	Test Statistic
Religion	Christian	115	89	46	28	14	6	298	$X^2 =$ 87.715
	Muslim	4	28	2	0	0	10	44	df = 20
	Traditional	22	15	15	2	1	6	61	P = 0.000
	Atheist	1	2	2	1	2	0	8	
	Other	1	2	0	0	0	1	4	
	Total	**143**	**136**	**65**	**31**	**17**	**23**	**415**	

Source: Field Survey (2022)

HA—Human Activities   HA & NAT—Human Activities and Natural Changes

NAT—Natural Changes   P of Sin—Punishment for sin

Not Appl—Not Applicable

92

Association Between Demographic Characteristics and Awareness of Climate Change

To ascertain if there were any notable variations across awareness levels (outcome variable) and community, marital status, educational level, and religion (independent variables), Pearson Chi-square tests were performed. All the chi-square results showed that the p-value is less than 0.05, thus, we reject the null hypothesis in favour of the alternate hypothesis that there are significant linkage between the dependent variable (awareness) and independent variables of community, marital status, educational level, and religion.

However, in terms of gender, occupation and age, the Pearson Chi-square tests show that the p-values are greater than 0.05. We, therefore, fail to reject the null hypothesis and conclude that there are no significant associations between the dependent variable (awareness) and the independent variables (gender, occupation, age)

Table 9: Association between demographic characteristics and awareness of climate change

Variable	Category	Awareness of CC		Total	Statistics
		Yes	No		
Community	Akwidaa	130	11	141	
	Anlo Beach	63	13	76	$X^2 = 11.643$
	Ampenyi	59	9	68	df = 3
	Gomoa Fetteh	101	29	130	P = 0.009
	Total	**353**	**62**	**415**	
Marital Status	Single	51	18	69	
	Married	226	26	252	$X^2 = 18.641$
	Divorced	23	10	33	df = 4
	Separated	15	4	19	P = 0.001
	Widowed	38	4	42	
	Total	**353**	**62**	**415**	

Table 9, continued

Educational Level	No formal Education	116	36	152	
	Primary Education	105	12	117	X^2 = 15.401
	Middle School	77	9	86	df = 5
	Secondary Education	43	5	48	P = 0.009
	College Education	4	0	4	
	University Education	8	0	8	
	Total	**353**	**62**	**415**	
Religion	Christian	264	34	298	
	Muslim	30	14	44	X^2 = 24.280
	Traditional	51	10	61	df = 4
	Atheist	7	1	8	P = 0.000
	Other	1	3	4	
	Total	**353**	**62**	**415**	
Gender	Female	173	32	205	X^2 = 0.143
	Male	180	30	210	df = 1
	Total	**353**	**62**	**415**	P = 0.705
Occupation	Fishing	90	18	108	
	Farming	80	15	95	X^2 = 7.694
	Fish processing	33	7	40	df = 5
	Trading	47	5	52	P = 0.174
	Others	83	9	92	
	No job	20	8	28	
Age	21-30	65	15	80	X^2 = 5.894
	31-40	110	14	124	df = 4
	41-50	65	16	81	P = 0.207
	51-60	52	11	63	
	60+	61	6	67	
	Total	**353**	**62**	**415**	

Source: Field Survey (2022)

Qualitative Results

The qualitative phase of this study involved conducting in-depth interviews and focus group discussions. The current investigation selected the

94

thematic approach to analyse the responses from open-ended questions. The qualitative study was conducted on all the research objectives except object two. The reason is that establishing and predicting relationships could very well be achieved with quantitative approach. In all, twenty interviews and eight focus group discussions consisting of people believed to have knowledge on climate were conducted. Five interviews and two focus groups in each study sites. The interviews and focus group discussions were conducted along gender lines. The average age of women's focus group discussions was 33 years and that of the men's group was 35 years. In terms of the interviews, the average age of the interviewees was 37 years.

Awareness and Perceptions of Climate Change

The participants of both focus groups and in-depth interviews were asked about their sources of climate change information and the mass media consisting of radio, TV, and newspapers were mentioned; personal observation or experience was also mentioned; as well as mobile phones. To consolidate the findings with some of the statements made by the participants, one said "*Apart from my personal experience from the 70s to 80s and now, I get information about climate change on the radio, TV, and at times if the district calls for meetings, the leaders go and when they come back, they also inform us*" (Interview, Akwidaa, 2022). Another participant from Anlo Beach said, "*Now, we go to sea with our phones so when there is some announcements or evidence of weather-related events, they call us at sea to find or seek for safety because those in the house will have more*

advantage than those of us at sea" (Interview, Anlo Beach, 2022). The table

below summarises participants' sources of climate change awareness.

Table 10: Respondents' sources of climate change awareness

Variable	Respondents' awareness sources
Sources of climate change awareness	Mass media -Radio -Television -Newspapers Personal experience Mobile phones Government officials from the district Assembly

Source: Compiled from focus group and interviews (2022)

Respondents' Understanding of Climate Change

The data sought participants' knowledge of climate change and the

analysis demonstrates that participants have varied meanings of climate change.

Some of the participants' understanding of climate change include changes in

weather conditions—variations in rainfall and sunshine, changes in rainfall, high

sunshine, decrease in rainfall, changes in times and seasons, changes in the setting

of the sun; harsh economic conditions; changes in rainfall regime; decline in farm

produce; disappearance of species; decline in fish catch; changes in vegetation

cover; coastal erosion. Some of the comments the participants stated are; "*In the

olden days, when we go to sea, we go for just a short distance, about thirty

minutes then we come with plenty of fish but now we will be gone for more than

three days but sometimes no catch in our canoe. Because of that we know the

world and the atmosphere have changed*" (Interview, Akwidaa, 2022). Another

participant noted, "*When we say climate change, the living conditions have been hard for us and because of that things in the world have overcome us*" (Men focus group, Akwidaa, 2022). Continuing, a man interviewed at Gomoa Fetteh had this to say: "*Now when you look at the sun, when we were young, when the sun was about to set, it goes straight but it is not like that today. Today, the sun set at north-west which was not so in the olden days and so changes in the climate is true*" (Interview, Gomoa Fetteh, 2022). The table below is a summary of respondents' understanding of climate change.

Table 11: Participants' knowledge of climate change in the selected coastal communities in Ghana

Variable	Respondents' Views
Meaning of climate change	Changes in weather conditions
	-variations in rainfall and sunshine
	-changes in rainfall
	-high sunshine
	-decrease in rainfall
	-changes in times and seasons
	-changes in the setting of the sun
	Changes in the water regime
	Decline in farm produce
	Disappearance of species
	Harsh economic conditions
	Decline in fish catch
	Changes in vegetation cover
	Coastal erosion

Source: Compiled from focus group and interviews (2022)

Perceptions of Causes, Signs/Impacts of Climate Change

The study sought participants' views about the drivers and repercusions/ impacts of climate change. The analysis shows that climate change is mostly caused by human activities, natural causes, acts of God, punishment for sins, and

97

poor leadership, and increase in technology. Regarding human activities as a driver of climate change, these are some comments from participants. "*The cutting of mangroves for firewood is also the cause of what we are experiencing now. For me, I don't think somebody somewhere is causing the climate to change. It is our own activities. The trees we cut, the bush or farm we burn, all account for the changing climate. I am saying this because I have been told that we have something like a blanket that covers the sun and the smoke we are producing is destroying it that is why the sun is very hot nowadays*" (Women focus group, Anlo Beach, 2022). Another unique human activity mentioned during the men's focus group discussion at Gomoa Fetteh was space exploration. A man indicated that "*We the blacks don't have knowledge of the sky. In time past, about 20 years ago, we heard that the whites have seen that a big stone was going to fall from the sky and warned everyone and again we heard that the sun that is high, something is covering the sun and the whites again, their atomic bombs they send to the sky have caused tears. We heard it on the radio. So, climate change is a result of activities of those who want to discover where God is*". Another participant interviewed at Akwidaa confirmed: "*…and let me digress a little bit. I heard some time ago that they said scientists go to the sun or the moon and due to that I think has been leakage in something covering the surface of the sun and so the sun's rays penetrate to reach us directly than before*" (Interview, Akwidaa, 2022*).*

Natural cause was mentioned as melting of ice. In view of this, a man interviewed at Anlo Beach confirmed: "*As for the causes, I have given you*

98

enough. They say the ice in Iceland and up there is melting every day and therefore the volume of the seawater is increasing and unfortunately, the rainwater upland is also being pushed into the sea, that same sea, therefore, the volume of the water in the sea has gone up. Water finds its level therefore it cannot go up. It must spread on the ground therefore, any low-lying area must be taken over by the sea" (Interview, Anlo Beach, 2022). The above perception shows an impact or consequence rather than causes of climate change. Climate change is also believed to be caused by increase in technology which gives people an opportunity to possess certain things like chemicals to use at sea and in the farm. One man said: "*The introduction of these chemicals through technology has resulted in the recent climate change because all these chemicals get into the atmosphere one way or the other*" (Men focus group, Akwidaa, 2022). Another stated: "*On the sea today, they have brought technological things to destroy the sea. These technologies include light fishing, unprescribed nets etc. Light fishing is something some countries used and it destroyed their sea and they stopped but Ghanaians who are greedy have introduced it here. It is not good but when they tell them to stop they do not*" (Men focus group, Akwidaa, 2022).

Climate change is also seen as an act of God and punishment for sins. In the view of these participants shared their views in this way: "*For us here, what we will say is that it is God who created everything and so if he is doing his things, we cannot question him*" (Women focus group, Gomoa Fetteh, 2022). Another woman interviewed confirmed: "*For the changes, Jesus said that a time will come things will become worst and now I can see the environment when you*

99

look at the sea, where the sea couldn't get to previously, now it goes. It is not something as punishment but it is the Bible that has predicted that a time will come when we will see all these things" (Interview, Akwidaa, 2022). Anlo Beach women focus group identified that the stopping of libation and sacrifices to pacify their gods are responsible for climate change and its impacts on their coast. A young lady among the group stated that, "*The little I have to say is that when I was young, we had some customs which our elders performed but those elders are no more now. When the sea rises those elders would perform the customs for the sea to be still but these elders, no one is alive. We the children here don't know anything so we are living in it as it is*" (Women focus group, 2022). Her statement was corroborated with that of an old woman in the group who reported: "*I believe it is because of the tradition. Formerly, our elders poured libation and offered sacrifices to cleanse the land but these days, there is nothing of that sort so it is affecting the community because as the young lady rightly said if they should continue the tradition, at least, it will reduce the impacts of communities being washed away*".

The above perceptions suggest that the veneration of smaller gods and ancestors through sacrifices and libation can reduce climate change and its impacts according to some people. Climate change is also thought as punishment from God because of man's wicked ways. Such views were stated as, "*Another thing I can say is that now our sins are several folds. It is also among the causes of climate change. This is because for love of riches, people kill their fellow human beings just for position*" (Interview, Anlo Beach, 2022). Another man had

100

this to say: "*If God tells you don't do this, you will do that, so if you do it, you get the punishment. You see as I am saying, we are not obeying the commandments of God so he can use that to punish us. That is why I don't blame somebody for my hardship. From my perspective, it is we disobeying God that is the major cause*" (Interview, Anlo Beach, 2022).

Regarding the signs and or impacts of climate change, the data elicited decline in fish catch, drying up of wells, changes in times and seasons, high temperature, poor living conditions, decreased life expectancy, fire outbreak, decreased rainfall, changes in rainfall pattern, famine, low temperature, and coastal inundation—coastal erosion, flooding, and heavy winds/storms. Participants acknowledged a high temperature today than some decades ago. Some of the participants' perceptions were captured as: "*In the fishing industry, the high temperature as I said, have reduced the fish by sending them away from our waters and for this reason, we don't get enough catch when we go to sea. When it happens like that our fuel cost becomes a burden and life becomes unbearable for some of us*" (Interview, Akwidaa, 2022), "*When I take how we started farming, we were not using fertilizers and the others, but crops were growing well but now if you don't apply fertilizer, what you put on the ground won't grow because the temperature/sun is too high so it can't produce anything for you leading to famine*" (Interview, Akwidaa, 2022), "*When the temperature is high like that many things happen. First, the water in the well you see here get lower. If you go there now, you will see that the water in it is lowered. This is the major problem we are facing here*" (Interview, Anlo Beach, 2022), "*Again, now,*

you will be there and they will tell you that there is an outbreak of fire here and there" (Interview, Ampenyi, 2022).

Coastal communities are faced with inundation due to erosion, flooding, and heavy storms which sometimes cause destruction and even death. Some participants share their experiences as: "*During the stormy season, going to the sea for fishing sometimes becomes dangerous. During this time, you are left stranded as to whether to go to sea, whether there will be a storm or not. So sometimes we may be there and suddenly, the storm comes that is why if God does not have mercy, and the boat capsized, someone can lose their lives. I remember that in some time past, we went to the sea and at night when we were coming, a storm blew and, in the night, our boat capsized and the net too was in the boat. We didn't know what to do and when it happens like that, if you don't know how to swim…..It has happened several times and many people have lost their lives due to that*" (Men focus group, Akwidaa, 2022). Drawing experiences on coastal erosion, this was what one man said, "*The Anlo Beach you see today as long was not like that some twenty years ago ooo! It was very wide to the extent that the distance from where we are seated to the coast was almost a kilometer away but due to sea level rise, the sea has eaten into the land taken away our buildings. You see my brother here, the sea has destroyed his house three times and looking at his age now, where will he get money to build another house*?" (Men focus group, Anlo Beach, 2022). Decreasing rainfall, changes in the pattern of rainfall, low temperature, and changes in times and seasons were also acknowledged. Some of their opinions presented were: "*Today, the rainfall pattern too has*

102

changed. The months you expect rains have totally changed so I always tell my children that what they taught us as seasons in schools should be different now because what we saw then has shifted completely. In the olden days, when it is September, October, November, the rains were heavy and normally fall at night but now do we see that? Now there is no difference between rainy season and dry season likewise minor rainy season and major rainy season." (Interview, Ampenyi, 2022). The participants' perceptions of the causes and the impacts of climate has been summarised in the table below.

Table 12: Perceptions of climate change among selected coastal residents used for this study

Variable	Participants' Views
Causes of climate change	Human activities - indiscriminate fishing and farming - deforestation - removal of the topsoil for construction - visiting the moon by scientists/space exploration - bush burning and burning of charcoal - mining activities - urbanization - smoke from factories and vehicles - sandwining Natural causes Punishment for sins Acts of God
consequences/impacts of climate change	high temperature -decline in fish catch, drying up of wells -fire outbreak, famine Poor living conditions decreased rainfall changes in rainfall pattern changes in times and seasons coastal inundation -coastal erosion -coastal flooding -Heavy wind/storms

Source: Compiled from focus group and interviews (2022)

103

Barriers to Public Understanding of Climate Change Communication

The researcher wanted to compare respondents' views from the quantitative and qualitative surveys about the barriers that militate against their understanding of climate change communication. The data from the qualitative is not different from that of the quantitative. However, the qualitative data elicited additional barriers to supplementing the quantitative. These are the problem of politics and poor reading attitudes among Ghanaians. The benefit of the qualitative data is that it provides the reasons why such barriers are considered. The table below illustrates some of the participant's views about the barriers to their understanding of climate change information.

Table 13: Barriers to public understanding of climate change communication among selected coastal residents used for this study

Barriers	Participant's Views
Language barrier	Another challenge I can say is the language. This community as you see is made up of different ethnic groups so passing information in one language remains challenging as only people in whose language it is delivered will understand the information to the detriment of the others who don't understand.
Lack of education	The main challenge here is the level of literacy which is low. Our educational level is low so sometimes, it is difficult to understand what we hear from the radio and television.
Limited interest and attention to information	Another issue I must say is that looking at the nature of our work, we don't have time to listen to radio or even watch television and even not all of us can afford these things.
Problem of politics	Sometimes, we don't pay attention to issues of climate change information on the radio and TV because we think is a particular government who is doing his own thing. People who are not in tune with such government will not take the information seriously and rather treat the information as propaganda.

104

Table 13, continued

Wrong timing of climate change communication	Considering the nature of our work and activities, passing an information at certain times and days will not be appropriate for us. For instance, speaking to a fisherman in the daytime will not benefit them because, by that time, they will be on the sea or shore and some of us the fishmongers, we have no time too when smoking our fish so if you do not plan the time, the information will not get to us.
Problem of media reporting	The media sometimes exaggerate some of the issues which limit our interests in this information. It seems there is a competition among the media partners for news updates and seasonal messages thereby grossing over climate change issues.
Poor reading attitudes among Ghanaians	Not all of us like reading so passing climate change information on social media and the rest can also prevent public understanding of climate change.
Mistrust in climate change information	Another reason is that sometimes what we hear from the weather forecasters does not happen as predicted or if they happen, they happen somewhere else, so it is difficult to trust and believe what they tell us sometimes.

Source: Compiled from focus group and interviews (2022)

Impacts of Climate Change Communication Barriers on Communities'

Adaptation

This objective was purely qualitative because it was difficult to get papers to review. The objective aimed to explore how the barriers or challenges coastal communities face in understanding climate change have affected their adaptation. Thematic analysis was performed on this objective following the protocols outlined in the methodology. Four themes arose from the interviews and focus group discussions which have been presented below. They are limited knowledge on adaptation; destruction of properties due to unannounced disasters; no adaptation at all; and poor living conditions.

105

Limited Knowledge on Adaptation

One pattern that was realised in the data was that the barriers, respondents face in understanding climate change have resulted in their knowledge on adaptation being limited. They do not know what adaptation strategies to employ in times of disaster. A man interviewed at Anlo Beach revealed that "*The lack of information about climate change or not understanding climate change has resulted in many disasters taken us by surprise. Most of the disasters we face that render us vulnerable are simply due to our lack of information. We are incapable of safeguarding ourselves because we lack knowledge on what to do to adapt properly*". Similarly, a woman in the women's focus group at Ampenyi maintained that "*These challenges have rendered us incapable of defending ourselves against any disaster because we lack knowledge on what can be done to protect ourselves in the wake of a disaster*".

Another man in Gomoa Fetteh focus group said, "*Our non-understanding of climate change issues makes us vulnerable to dangers like erosion, storm and others. This is so because we are incapable of preparing ourselves well in meeting those challenges all because some of us because of low level of education, knowledge on what to be done in times of disaster is very low. Sometimes, we may take it as normal and so when it happens, we rely on our own knowledge and do what we can to control it*". A man interviewed at Ampenyi said, "*Because we don't know what to do to prepare and face them when such misfortunes come that is why the buildings you see along the coast are mud and*

106

thatch because we know the sea can rise and take them away and because we don't have money" (Interview, Ampenyi, 2022)

Destruction of Properties Due to Unannounced Disasters

The data also discovered that the barriers that militate against public understanding of climate change information results in unaware disasters that can result in the destruction of properties such as buildings, farmlands and sometimes death. This is because they either do not get the information at the right time or do not get the information at all. A number of participants in both the interviews and focus group discussion recounted that some disasters take them by surprise simply due to lack of information. In view of this, a woman in Gomoa Fetteh focus group discussion shared that: "*Sometimes, because we don't hear any information about the changes in the weather, our husbands will go to sea and face storms and at times, some even lose their lives in the process. I think about three years ago, there was a heavy wind which took off people's roofs and rendered many homeless but we never had any information from anywhere. It was after it happened that some radio and TV stations came to pick it up as news. But if we had had the information earlier, we would have prepared even if it meant mending our roofs so the information we don't get at all or get late is affecting us here very much. We are on a hilly land and so when the wind is blowing, it is very dangerous*".

Similarly, a man in a focus group discussion in Ampenyi held: "*Sometimes, you will be there and you will see water gushing into your room because of sea level rise; heavy storms take us by surprise and renders our houses*

107

with half or no roof most of the time. This is because we lack the education necessary to equip us with knowledge on adaptation and for that matter, we are faced with disasters which we think cannot be managed". A man interviewed in Akwidaa maintained: "*If I don't hear anything about any impending event, it will come as a flash and by the time you realise things have gone bad. There are frequent storms which make the sea to overflow and destroy buildings*" All the men in Akwidaa's focus group unanimously said that: "*just last week, the sea was running in the town*"

Little or No Adaptation

The shortage of knowledge of climate change due to barriers to public understanding of climate change makes coastal communities sometimes powerless to practice any adaptation mechanisms. This is compounded by the belief of natural occurrence of certain disasters. Their beliefs of natural occurrence of certain disasters make them think that nothing can be done in mitigating the disaster. Some of the respondents shared their views as: "*Our limited knowledge and understanding of climate change limits our choice of adaptation strategies. Because we don't understand climate change issues. Here, when there is flooding, we abandon our houses until the water subsides. We do not do anything until it naturally retreats*" said a man in Ampenyi focus group discussion. Another man from Gomoa Fetteh focus group discussions opined that "*Our limited knowledge in climate change is impeding our adaptation efforts and sometimes, we don't even do anything at all. For me, I believe personally that it has become normal with me because as you live by the sea, you should expect*

these things and so when they come it is no news. For example, if flood comes, it goes by itself and so why should I worry about something which will come again. What is not good is shifting the blame from one person to another instead of bearing the problems ourselves and finding lasting solutions to them". Sometimes, they only rely on their indigenous knowledge which is not always the best. They also claim to rely on the mercy of God whenever they encounter climate change challenges. A man from Ampenyi group discussion was of this view: "*We rely only on God and our little experience to cope with climate change impacts. Because we can't do anything about them. When they come, we do nothing, especially when there is flooding, we will only wait till the water subsides and we have done this for so many years. After the disaster and the relief items from government, we go back into our original place".*

Poor Living Conditions

Owing to the dearth of knowledge of climate change information, people's living conditions have been affected. This is because such people rely on indigenous knowledge of adaptation which is invariably not the best. The reliance on traditional knowledge renders them vulnerable to climate change impacts. When the impacts of climate change become too great for the people because of a lack of coping strategies due to the over-reliance on indigenous mechanisms which are not necessarily effective, it affects their conditions of living. The interviews and focus groups recorded some of the respondents' reactions. A man in Ampenyi group discussion held that "*Mostly, we build with mud and thatches because we know it could be destroyed easily but we think it is not expensive and*

109

so we rely on it like that. What we only know is that flood and erosion come and go at their own time and so we are used to it". Another woman interviewed at Akwidaa said, "*Because we do not know what to do to cope with the negative impacts of climate change, it affects our living conditions. We find it difficult to make ends meet because what we plant does not grow well and we do not know what to do improve our farming*"

Ways of Improving Climate Change Communication

The focus group and in-depth interviews again solicited views about what could be done to improve climate change and in addition, to supplement the quantitative data presented earlier, adequate translation, tailoring climate change communication to a specific audience, communicating human-cause climate change, introducing sanction into climate change communication, dramatised climate change events, avoid politics, communicate solution, and all hands on deck in climate change communication, were identified. The perceptions of the participants have been summarised in the table below.

Table 14: Ways of improving climate change communication among selected coastal residents used for this study

| How to improve climate change communication	Participant's Views
Using different channels to communicate climate change	I suggest the use of the information centres. Nowadays, we are blessed with them in the villages. There, the information will be passed in our own language by our people and so we can ask questions and seek clarifications.
Introduce climate change in school curriculum	We should introduce climate change education in our low-level education curriculum. When the children are growing, they will adapt by themselves which can help them to make life.

110

Table 14, Continued

Public education on climate change	First, I should know the thing that they call climate change. I should, first of all, know that. If you know it before you can educate somebody that if this thing happens, do this. So, what we should do now is that those who know those things should come out and teach us so we also take it from there and teach others.
Tailoring climate change information to a specific group	I also think when the communication is tailored to specific audience for instance, fishermen, and goes straight to the point, I think we can understand it properly.
Communicate climate change in local language	I think the communication should be done in our own local language so that we can understand it better.
Training of climate change communicators	If you frighten somebody with some information the person will not pay attention to it. For climate change communication to realise its goal, journalists who pass the information must be trained on the ethics of communication. They should stop always frightening the public or else we might think the information is not serious for attention.
Introduce sanction into climate change communication	Climate change communication should be backed by laws so that people can respond to the communication positively. We must introduce sanctions in climate change communication such that anyone who goes contrary to the rules regarding how to protect our environment, should be punished.
Dramatise climate change events	We can also use students in climate change communication by conducting drama. People tend to remember dramatised news better than just passing the information.
Avoid politics of climate change	Okay, if you come in the name of a particular party, you will be hated among others. For example, as you have come, if you came in the name of a particular party, the other opposition members would hate you, you understand? But if you don't come in the name of any party, it is possible people will listen to you.

111

Table 14, continued

Communicate solution	My concern is that scientists should not always blame us as the cause but rather provide real-life solutions we can engage to solve the mess. It will be better if solutions are provided in the communication so that we can follow to reverse the change. This will help rather than always accusing one person or the other and proffering no solution to the situation.
Timely information delivery	Looking at the timing of our activities, we are always busy and so having time to listen to the news is difficult. If you want us to hear about climate change and understand it well, Friday can be set aside for us all women and we will come so that you educate us and for men, Tuesday is appropriate because they don't go to sea.

Source: Compiled from focus group and interviews (2022)
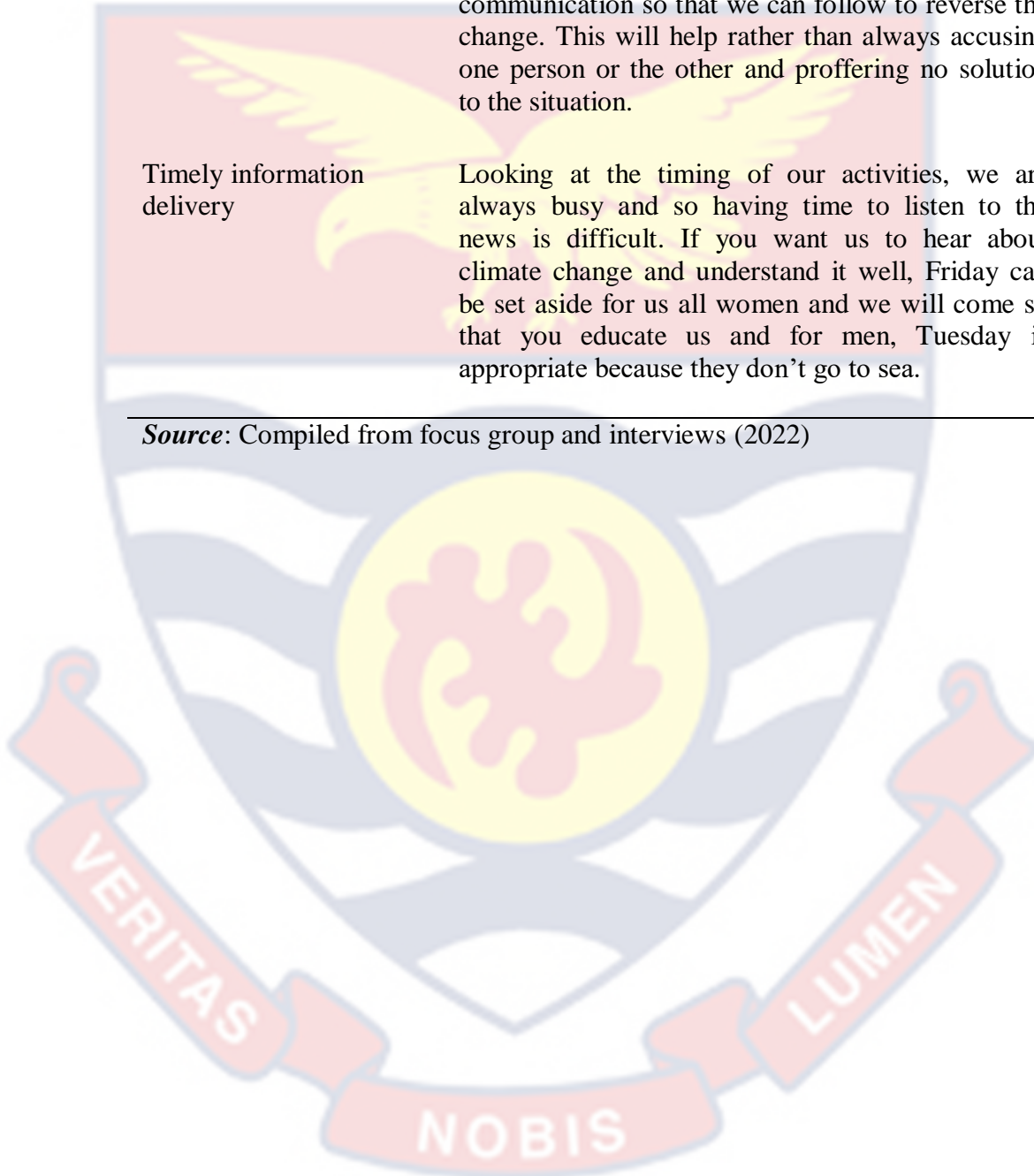
DISCUSSION OF FINDINGS

Awareness and Public Understanding of Climate Change

Raising public awareness and enhancing comprehending climate variability and change is essential for addressing and alleviating the impacts of climate change and its related challenges (Ohene-Asante, 2015). People must be aware of and be knowledgeable about issues before taking proper action (Asekun-Olarinmoye et al., 2014). The seriousness and degree of personal worry individuals have towards the ramifications of climate change are closely correlated with their knowledge of the human sources of climate change. People's awareness of climate change will probably increase their concern to address it (Eichhorn et al., 2020). Earlier studies into climate change awareness across the world and among Ghanaians have shown a high level of consciousness. The current study shows a high level of climate change awareness (85%). This confirms earlier studies such as Ankrah (2020), where there was a hundred percent awareness among coastal Winneba, 97.6% among farmers in the Adaklu District (Mensah, 2018), and 94% among the people of Greater Accra (Sarfo et al., 2019).

Across the world, the study concurs with Leiserowitz et al. (2015) who revealed that the majority of Americans were aware of climate change. Pickson (2021) discovered a similar finding where most farmers in Chengu (China) said they were conscious of climate change and its impacts. Awareness was highest among all the selected communities and married people, fishing, age group of 31-40 years, Christians, those with no education, and among both gender groups.

Although awareness is high among respondents, the qualitative data depict that the majority of the respondents do not understand climate change.

In the qualitative study, people's understanding of climate change was likened to changes in the weather conditions. The finding above agrees with reported literature. A number of Ghanaians do not comprehend the science behind climate change despite noticing variations in the atmosphere and seasonal shifts. They report higher temperatures, prolonged droughts, and growing seasonal rainfall variability (Neville & Mohammed, 2010). Despite noticing variations in the weather and seasons, they could not situate it within the timeframe of global climate change. A study conducted in Africa revealed that although the majority of Africans are knowledgeable of shifting weather cycles, they have little understanding of worldwide climatic changes (Burton et al., 2012; Neville & Mohammed, 2010; Ohene-Asante, 2015). Even when individuals are conscious of changing climate, the topic is frequently poorly comprehended (Burton et al., 2012). They confused the meaning of climate change with causes and impacts of climate change. For instance, in the quantitative survey, the majority of respondents understood climate change to mean a decline in fish catch, which happens to be a consequence. This concurs with research across the globe that individuals are largely perplexed by the notion of climate change (Capstick et al., 2015; Leiserowitz et al., 2015; Weber & Stern, 2011).

The mass media encompassing the radio, television, and newspaper constituted the major medium for climate change awareness for the communities which confirms the findings of Ogunbode et al. (2019) and Sraku-Lartey et al.

114

(2020). Conversation with people and family members constituted significant channels through which respondents became aware of climate change. This also supports the results of Foss & Ko (2019) and Sraku-Lartey et al. (2020). Other least but equally important sources were the social media, school, government officials, community information centres and Non-governmental organisations (NGOs). Data from the focus group and individual interviews elicited mobile phone and personal experience of respondents as significant means by which they became aware of climate change. This agrees with Foss & Ko (2019) where personal experience constituted a source of climate change to teachers and the general public in Texas. Based on their personal observations and experience in time past and now, they testified that indeed there is climate change. The consequence of this finding is that no source of information should be relegated but should be fully utilised so that the awareness would be fully realised (Ogunbode et al., 2019).

Perceptions of Climate Change

According to research, how people perceive global warming provides a cornerstone in developing techniques to deal with its effects (Yu et al., 2013). Evidence from the analysis shows high perceptions of climate change as human cause and acts of God with a percentage parity of 55%. The analysis means that the respondents have ambivalent views about what drives climate change. This conforms with several literature. Reported findings show that approximately half of Africans (52%) attribute climate change to human action (Selormey et al., 2019). Over half of Americans (58%) understand that global warming is mostly

115

human-caused (Leiserowitz et al., 2018). Climate change is an outcome of man's activities such as combustion of fossil fuel, deforestation, and increasing livestock (Jackson, 2021). Odonkor et al. (2020), in a similar study in Ghana, discovered that vast percentage of respondents (54.2%) blamed climate change on the combustion of fossil fuels like petroleum and petroleum products, second by greenhouse emissions from automobiles (17.5%), forest loss (17.1%). When fossil fuels are burnt, carbon dioxide, a greenhouse gas, is released which magnifies the greenhouse effect and contributes to climate change (Government of Canada, 2019; Met Office, 2019). Deforestation releases carbon that has been stored within trees and vegetation into the atmosphere. Africa's deforestation rate is about double that of the rest of the world, with the continent losing approximately 4 million hectares of forest per year (AfDB, 2012).

The respondents also perceived climate change as a natural process and as well as the combination of human activities and natural process. This confirms Selormey et al. (2019) where 16% of respondents perceived climate change as manmade activities mixed with natural causes. Over one-quarter (27%) believe that natural processes alone are to blame for climate change (Selormey et al., 2019). About three in ten (28%) Americans say climate change is mostly due to natural changes in the environment (Leiserowitz et al., 2018). Even while the earth's natural forests and oceans trap carbon emissions from the atmosphere through photosynthetic process and other activities, these natural absorbers are incapable of keeping pace with current rising emission levels (Denchak & Turrentine, 2021). According to the participants, mining, fishing and farming

cause climate change because the chemicals involved in these activities get into the atmosphere in the long run. Farming and road construction can change the earth's reflectivity, resulting in localised heating and cooling (Denchak & Turrentine, 2021; Government of Canada, 2019). Again, some participants shared that testing of atomic bombs and space exploration can cause climate change. This is because the chemical spray destroys the ozone layer that covers the Earth's surface. The depletion of the ozone layer has resulted in the sun's rays coming directly at us which was not like what they were experiencing in time past.

The present enquiry reported that another significant majority of the respondents were of the view that climate change is an act of God and punishment for our sins. This supports the finding of Roser-Renouf et al. (2016), who reveal that 15% of Americans thought that it is God that controls the climate and for that matter, man can not be causing climate change and some other whilst some 14% hold the view that climate change is a harbinger of impending doom (Roser-Renouf et al., 2016). Similarly, a comparative study of farmers in Ghana discovered that the vast majority of respondents (28.3%) believe global warming is an evidence of God's purpose to herald impending doom (Boon & Ahenkan, 2012; Codjoe et al., 2013), 12% blame man's corrupt nature for climate change. They believe it is God's vengeance that is being poured out on humanity as a result of our sinful, greedy, untrustworthy, and rebellious ways (Boon & Ahenkan, 2012; Codjoe et al., 2013). The survey also discovered that the stopping of libation and sacrifices as means to pacify the gods and ancestors is the cause of

117

climate change impacts on our coast. The adherents of this belief held that the veneration of the ancestors and the gods in the olden days did not result in any climate change impact on their coast. The consequence of such ingrained belief and perception means that individuals or countries do not seem to have any authority, power, or obligation for what belongs to God (Wolf & Moser, 2011). In other words, since the belief that whatever happens in the atmosphere is not as a result of man's influence, engaging in behaviour that reduces man's influence on our climate becomes almost impossible. Ascribing changes in the atmosphere and climate to God, therefore, means that we are sitting down aloof to look up to God to reverse the trend.

Perceptions of the Signs/Impacts of Climate Change

The study further sought respondents' perceptions of climate change effects or the signs of climate change and the findings from both methods were parallel. The results show that rising temperatures and sea levels are the major impacts coastal communities in Ghana, are facing. The current findings are in unanimity with several other literature. For instance, a quantitative study on climatic data in Sri Lanka by Alikhan (2013) saw that temperature has risen while rainfall has dropped.

The findings of Mensah (2018) in a similar study in Ghana corroborated the above revelation. Decreased precipitation and increasing temperatures are putting a load on limited water supplies (USAID, 2017). Changes in rainfall patterns have reduced agricultural productivity leading to famine as noted by the participants in the focus group discussions (Abrams et al., 2017; Carmin, 2012),

118

deteriorating water security (Müller-Kuckelberg, 2012; Tadesse, 2010), decline in fish catch as temperatures rise (UNDP & GEF, 2018; Wondimagegn & Lemma, 2016), and changes in vector-borne illnesses (Agbeko et al., 2018; Asekun-Olarinmoye et al., 2014; FAO, 2008). More intense rainfall enhances erosion, whereas less overall rainfall reduces water flow (MoFA, 2018). High temperatures exacerbate and enhance the frequency of environmental calamities such as hurricanes, flooding, heatwaves, and wildfires (Denchak & Turrentine, 2021). People near the coasts, where fishery supplies are vital to the indigenous industry are affected, devastating living conditions and putting the region on the verge of economic collapse (Anne et al., 2018; Denchak & Turrentine, 2021). The repercussions of climate change coupled with limited knowledge and understanding has resulted in the poor living conditions of the coastal inhabitants as discovered from the study.

Observed Perception about Temperature and Rainfall

The dominant perceptions of rainfall and temperature across the study sites were high temperature and a reduced rainfall. The respondents' observations are parallel to other studies. Ghana's climatic trajectory reveals that precipitation has been declining while temperatures have been rising (IPCC, 2007). Ndamani and Watanabe (2015), and Alikhan (2013) also note that the majority of their participants thought precipitation amounts have decreased over time. The responses from the respondents are supported by local findings by Acquah (2011), Mensah (2018), Ohene-Asante (2015) who also report that there is a reduction in rainfall as a result of climate fluctuations in Ghana. In terms of temperature, the

119

results are consistent with (Mensah, 2018), Ohene-Asante (2015) who reported that most of the farmers interviewed in the Adaklu District and people around the Muni-Pomadzi perceived a rise in temperature. High temperatures will further increase, and rainfall patterns will be less predictable (MoFA, 2018). According to the participants in the qualitative study, the intensity of the sun is very high compared to the olden days and that rainfall has reduced drastically. The major cause ascribed to the reduced rainfall is the cutting down of trees. According to them, the trees facilitate rainfall and provide shade and also protect the towns against heavy wind. The participants also claimed that the cutting of trees has resulted in increased intensity of the sun's rays reaching the earth. The burning of bush, smoke from factories, testing of atomic bombs have destroyed the atmosphere's ozone layer thereby creating holes in it.

Predictors of Climate Change Communication Perception

The binary regression output revealed that only occupation and community are important predictors of climate change communication perceptions. Occupation influences peoples' views about the ongoing climate change communication according to the regression results. The reason can be that climate change impacts almost all activities one way or the other and the impact is very pronounced along the coast compared to inland. Based on their knowledge of indigenous adjustment to climate change impacts, they are able to assess and know whether the communication has improved their livelihoods and adaptation strategies or not.

There is also a relationship between where people live and their perception of climate change communication. The reason behind this is that not all communities have equal access to information. Some people have access to a wide variety of information sources, especially those who reside in wealthy urban areas. Contrarily, those who reside in underprivileged areas often times lack access to the information they require to enhance their quality of life. In numerous remote regions of emerging nations, the situation is extremely dire (Ndinde & Kadodo, 2014; Selormey et al., 2019). Ifukor (2013) emphasised the ineffectiveness of transferring developmental knowledge to remote places. Rural villages are classified as "information-poor" communities because they lack access to information while urban centres have access to all the information they need (Ofori-Birikorang & Aggrey 2018). There is, therefore, no wonder that the communities see climate change communication as not effective per the negative coefficients in the regression analysis. This is because these communities are rural communities where access to information in general, and climate change information in particular, is difficult.

Barriers to Public Understanding of Climate Change Information.

Lack of education is a major constraint to the public's understanding and adoption of climate knowledge in the research communities as evidenced by 22% of the respondents. There is high illiteracy rate among the research sites as the majority of the respondents fall in the lower educational categories—no education, primary education, and middle school. Literature has opined that Ghana's adult literacy rate is lower than that of other Sub-Saharan African nations

121

(GSS, 2021). The participants noted that the low level of education makes them unable to read and understand climate change information. This finding resonates with what Antwi-Agyei et al. (2021) reported, the high prevalence of illiteracy in northern Ghana prevents farmers from using information on climate change. They assert that education level is often correlated with information intake, with people with higher levels of education better understanding how to use climatic data to manage farms (Antwi-Agyei et al., 2021).

Another barrier that was mentioned was the problem of language. Language remains a barrier to getting our thoughts over to others (Abuarqoub, 2019). The language used to communicate climate change may pose a challenge to respondents' understanding of the information as highlighted by some respondents. This is in consonance with Antwi-Agyei et al. (2021) wherein participants bemoaned how challenging it was to interpret the language used to convey meteorological information. Coker and Ngula (2020) also reported a similar finding where scientists found it difficult to interpret scientific terminologies to students in their local language due to complicated vocabulary. According to some opinion leaders, language is one of the biggest obstacles to African's participation in the conversation about climate change (Burton et al., 2012; Neville & Mohammed, 2010). Climate change vocabulary is little comprehended and lacks conventional equivalents in African dialects (Bruine de Bruin et al., 2021; Burton et al., 2012; Neville & Mohammed, 2010; Ohene-Asante, 2015). Given this, the language barrier hinders verbal communication and generates a linguistic gap between social interactions (Chen, 2018). Literature

indicates that the failure to use words that other persons understand stops a message from being understood (https://www.businesstopia.net/communication/language-barriers). The prioritisation of English language in climate change dissemination coupled with the paucity of translations undermines the public's knowledge of climate change according to the current study.

Information overload was found to impede public understanding of climate change among a minor group of respondents (9%). Being overloaded with information means possessing a limited capacity to absorb it (Sadiku et al., 2016). People are struggling to swiftly and comfortably find the necessary information because of an "information glut." The amount of information has greatly increased as a result of new technological advancements. From a variety of print, digital, and internet outlets, individuals are having difficulty finding what they want (Mostak & Hoq, 2014). The findings of this work indicate that there is too much information participants hear from the radio and TV and sometimes it becomes difficult to remember. People find it difficult to either sift the good information from the bad ones or find it tedious to process and recollect information because the media do not repeat earlier information due to their interest in new stories. Sometimes too, people's inundation with information makes them reject such information. The findings above concur with a study done in the UK where perceived information overload was cited as the reason why people lack awareness of climate change (Lorenzoni et al., 2007). Overwhelming the audience with information can discourage them from learning more about climate change (Wibeck, 2014). Scientists frequently go into extreme detail,

making it challenging for individuals to determine what is crucial. Lengthy talk results in less attention (Somerville & Hassol, 2011).

Lack of attention to and or interest in climate change communication constitutes another barrier to respondents' understanding of climate change information. According to respondents, the lack of attention to climate change information is due to their busy schedules resulting from the busy nature of their work, harsh economic conditions, and how the media delivers messages. The participants in the interview and focus group stated that they do not pay attention to climate change information because they do not have time to listen to news due to their activities. In addition, limited interest and attention can also come from the way information is communicated by the media according to some participants. Harsh economic condition was also blamed for limiting attention and interest in climate change information. This is because people are juggle between their means of sustenance and therefore do not have time for news not even to talk of climate change. This finding is consistent with the study of Lorenzoni et al. (2007) where lack of desire to seek information was responsible for individual's lack of knowledge among the UK citizens.

The results also showed that mistrust in climate change information could account for the low understanding of climate change among people. It was reported in the interview and focus group discussion that climate change information is given by the Ghana Meteorological Agency but sometimes the information they give does not happen and even when it happens, it does not occur where it is predicted to. The above finding supports other literature.

124

According to Antwi-Agyei et al. (2021), the paucity of faith in climatic data can be related to smallholder farmers' prior experiences with the national meteorological agency's erroneous projections. People often ignore information from sources they perceive as being unreliable or untrustworthy (Lorenzoni et al., 2007). A report by The American Psychological Association (APA) cited in Hafner et al. (2019) postulated that distrust in the information given by government authorities could be a crucial factor limiting efforts to fight climate change challenges.

The channel through which information is conveyed can also serve as a barrier to public understanding of the information. Climate change communication demands choosing the right messaging platform because, for messages to be efficient, they must be directed at a certain audience (Moser & Dillings, 2012). This is because understanding these sources enables producers of climate change information to pinpoint reliable and accessible channels for spreading their knowledge (Siyao, 2021). Although it is widely agreed that the mainstream press is the primary provider of climate change information, its efficiency has been questioned, especially in Africa, where access to the media is limited and literacy rates are low (Chari, 2016). The qualitative data show that the respondents perceived the mass media to be not effective to communicate climate change. Media stories frequently glamorise climate change information, instilling fear in ordinary individuals that we will perish when the world collapses (Mannar, 2014). Media are perceived as biased, exaggerated and inconsistent in their coverage of issues like climate change (Lorenzoni et al., 2007). The respondents

125

acknowledged that the mass media is monopolised where expert voices are the order of the day thereby restricting their involvement. One could argue that ordinary people's limited participation in discussions contributes to their inadequate understanding and reception of climate change (Evans et al., 2018).

Access to meteorological information is essential for helping coastal communities to prepare in advance for any unforeseen events. The study indicated that the limited knowledge of communities in climate change could be due to dearth of climate change information. This revelation is in consonance with other studies. Inadequate weather information due to ineffective flow of information from Meteorological Service Department and the Ministry of Food and Agriculture was perceived by farmers in the Sissala West District as serious constraint to adaptation (Fagariba et al., 2018). Antwi-Agyei et al. (2021) reported that the majority, about (81%) of their participants espoused that one of the major obstacles preventing subsistence farmers from using climate data was a lack of information on seasonal forecasts for long-term preparation.

Another barrier to public understanding of climate change found in this study is poor reading culture among Ghanaians. The respondents acknowledged that Ghanaians do not like reading and so putting information on social media platforms has no influence. This is also in tune with other reported studies. Africa's developing countries suffer from the canker of poor reading culture, because so many people do not read regularly. The same issue exists in Ghana, where the majority of people are not interested in reading. This observation is more prevalent amongst the youth and students (Owusu Nsiah, 2020). Poor

126

reading habits among tertiary students have an impact on their grades and overall well-being (Agbevivi, 2022).

Access to technology and politics were also reported by the respondents in both studies as barriers to their reception and understanding of climate change information. The respondents theorised that they do not have radio and TV where they can listen to or watch news. They also claimed that frequent power outages in Ghana makes it difficult for those who have the technologies to watch and or listen to news. In terms of politics, the results indicated that people can sometimes miss vital information including climate change information because they think such information originates from a particular ruling government which they are in opposition to. This concurs with a study where politicisation of climate change was named as a challenge in climate change and its engagement (Howarth et al., 2020).

The qualitative results show that poor timing of climate change information constraints public understanding of the information. The participants mentioned that climate change information is passed after the event has occurred or when people are busy. This agrees with literature such as Antwi-Agyei et al. (2021) where late delivery of climate forecast or information was perceived as a constraint to farmers' uptake of climate change information among the agro-ecological zones of northern Ghana.

127

How Barriers to Public Understanding of Climate Change Affect

Communities' Adaptation

The objective of the investigation explored how the barriers to public understanding of climate change identified in the third objective, affect the living conditions of coastal dwellers. The findings held that the non-understanding of climate change information due to barriers to public understanding have resulted in limited knowledge on adaptation, no adaptation at all, destruction of properties due to unannounced disasters, and poor living conditions. The participants claimed that they lack knowledge on adaptation to climate change. They do not know what to do when disaster surfaces. As a result, they depend on their native wisdom to cope with climate change impacts. In the aftermath of growing climatic consequences, rural people in Ghana have depended heavily on indigenous wisdom to conserve resources that sustain their lives. Indigenous knowledge has strengthened traditional adaptation strategies at the local level, but it has not had the desired influence in terms of climate change resilience (UNEP & UNDP, 2013).

The results also highlighted that the lack of understanding of climate change information leads to little or no adaptation. According to the study, coastal communities engage in the do-little or do-nothing approach as a way of adapting to climate change. The reason alluded to that was that the impacts come and go at their own time. Some participants expressed they only relied on the mercy of God because they could not do anything about them. Some participants bemoaned that whenever there was flooding, they would have to wait till the water subsided. The

128

only thing they could do was to vacate their rooms and seek temporary accommodation with unaffected relatives. Their beliefs in natural occurrence of disasters make them think that nothing can be done to mitigate the disaster. They see the impacts as not within their domain and such perception limits the range of conceivable solutions according to Anastasiadis (2006).

The data also discovered that the barriers to public understanding of climate change information results in sometimes, unaware disaster that can result in destruction of properties such as buildings, farmlands and sometimes death. This is because they either do not get the information at the right time or do not get the information at all to prepare in advance. Most participants in both the interviews and focus group discussion recounted that some disasters have taken them by surprise simply due to lack of information. They claim that sometimes, the information would come after the so-called disaster has occurred. The efficacy of battling global warming is the dissemination of knowledge on adaptation to the ordinary man (Upadhyay & Bijalwan, 2015). In marginalised populations exposed to global warming impacts, a dearth of valid information might limit adaptive activities or possibly result in mal-adaptation (Ospina, 2011; Pickson, 2021). Literature opine that not having access to information, is a barrier to adaptation (Larson, 2019).

Finally, when the impacts of climate change become too great for the people because of lack of coping strategies due to the lack of understanding, it affects their conditions of living. The participants maintained that they live in thatch houses because they know the sea can wash them away. Because of that,

they will not commit huge resources into buildings that are likely to be washed away. Coastal communities are described as poor and marginalised and are exposed to climate change consequences (Pickson, 2021). They live in deteriorating housing conditions, depend on untreated drinking water, and receive poor health care. The participants recounted that because of the recent dwindling fish catch coupled with the low harvest from farming activities due to climate change, they are unable to cater for their children's education.

Improving Climate Change Communication

The study's final objective sought the people's views about what could be done to enhance climate change communication to facilitate understanding and engagement. Based on the results, one way of making climate change communication effective in order to better public understanding is to communicate climate change in the local languages. In addition to the use of local languages, the findings revealed that one local language must be translated into another due to the cosmopolitan nature of Ghanaian cities and towns. Literature in this regard, advises scientists to talk plainly and carefully select their terms since many phrases that sound totally ordinary to scientists are unfathomable jargons to the rest of the world (Somerville & Hassol, 2011). Therefore, this cannot suffice to improve public understanding of climate change. The respondents were of the view that speaking and translating information in the local language will improve understanding, and therefore called for the prioritisation of indigenous languages in climate change communication. A precondition for growth is properly communicating and getting the information comprehended. Disseminating

130

information becomes meaningless when there are barriers along the way (Musheke & Phiri, 2021). Perfect communication occurs when a thought or concept is delivered in a way that the recipient's perception matches that of the speaker (Cobley & Schulz, 2013; Musheke & Phiri, 2021). Using simple concepts, proper delivery channels, local language, and cultural norms relevant to the place must all be used to transmit the information (Bisht & Ahluwalia, 2014).

In addition, instead of discussing causes and effects, highlighting solutions has shown significant potential in allowing the audience to imagine a good and desireable future while remaining engaged with the issue (Markowitz & Guckian, 2018). The respondents and participants mentioned that climate change communication has invariably been on the causes and impacts. It does not tell them what should be done to reduce the impacts. The finding above resonates with other studies across the world. People are more inclined to see climate change as an issue worth addressing when they feel there are accessible solutions (Markowitz et al., 2014). Moving away from scaring individuals and focusing on the rewards of the lifestyle adjustments that are required is critical to achieving long-term involvement and action (Howarth et al., 2020). The Intergovernmental Panel on Climate Change (IPCC) stresses in its climate science communication guidelines that communicators of climate change should present solutions along with the science (Holmes & Hall, 2019). A fundamental objective for climate communicators should be to assist people in envisioning a brighter future for their families and communities free of hazardous climate consequences. This will increase feelings of personal and group efficacy while also removing possible

131

barriers to involvement and action. One method to achieve this aim is to provide the audience with tangible, believable climate change solutions (Markowitz et al., 2014).

Using different channels to communicate climate change was emphasised by the respondents and participants. The respondents' view of the mass media as linear and aristocratic, called for different channels to communicate climate change. The majority of the respondents called for the use of indigenous communication channel such as community information centres, to deliver climate change messages. This according to the findings will promote communication in the local language, and allow questions to be asked and clarifications sought after the information. In addition, it eliminates the challenge of not having radio and television. Other channels mentioned included the use of information vans, churches, and direct engagement. Previous studies have posited that indigenous communication systems utilize interpersonal modes effectively, making them well-suited for discussing complex topics like climate change (Chari, 2016). Moser and Dilling (2012) found that face-to-face conversation is more efficient than the media at disseminating global warming information. Face-to-face messaging enables discussions to develop between the talker and their listeners. Additionally, it makes it possible to establish the two-way participatory information flow that characterises indigenous communication systems. There is also the establishment of rapport between the communicator and their audience through the interactions (Moser & Dilling, 2012). Because climate science issues can be challenging to understand, indigenous communication

132

mechanisms that have proven beneficial to local communities in Africa, simplifying complex matters, are crucial for effective climate change dissemination techniques (Chari, 2016). Making sure information that is delivered is valuable, suitable, and attainable requires a knowledge of the differential efficacy of various materials and paths (Lumosi & McGahey, 2016).

Another way climate change communication could be improved according to the study is through training of climate change communicators and or messengers. Successful engagement involves finding and recruiting trustworthy messengers and or communicators as well as interacting with audiences via their preferred information channels (Markowitz & Guckian, 2018). This is because without that, one's message is a collection of words. Cognitive research has repeatedly proven that who says what matters considerably more than what is said (https://com-matters.org/attribute/messengers/). Community members perceive trusted messengers or communicators as reliable sources of information (Wright et al., 2021).

Providing accurate climate change information and on time was identified as another way to improve climate change communication. The respondents in the survey and participants in the interviews and focus group discussions espoused that climate information should be delivered on time to enable them prepare in advance. The finding is parallel to several other literature materials. For example, farmers' exposure to climate data has a lot of opportunities for helping them make better judgements, reduce hazards, take the opportunity of pleasant weather, and adjust to changes (Zakari et al., 2022). Furthermore, supplying timely

133

meteorological data is critical for successfully assisting agricultural households in their adaptation to climatic changes (Pickson, 2021). The supply of important information in kinds and formats that community members can understand is critical to community-based adaptation (Bisht & Ahluwalia, 2014).

The high rate of illiteracy among the study communities makes the people lack the requisite understanding of climate change issues. Given the above premise, the respondents in the survey and participants in the focus groups and interviews proposed that public education on climate change should be given to them regularly. Such education according to the people, should take place on the community information system, and it should be in their local language. In view of this, the institutions responsible for educating the public should be charged to educate the public on climate change using these approaches. The national communication authority, district assemblies, the national commission for civic education, the Ghana Meteorological Agency and NGOs must task themselves to educate the public via preferred channels. This will improve the awareness and public understanding of climate change. Knowledge and awareness are necessary conditions for people to take action. Individuals' consciousness of climate change will probably increase their concern to act (Eichhorn et al., 2020; Khatibi et al., 2021; Samuel et al., 2018).

Education is a crucial element and a driver for addressing world climate change since it fosters understanding and skill growth (United Nations Institute for Training and Research [UNITAR], 2013). The respondents from both studies posited that climate change communication could be improved with the

134

introduction of climate change in Ghanaian school curriculum. They believe that when climate change is learnt in school, the students will grow with it. Incorporating climate change education into all levels of school curricula will ensure that students understand the subject effectively and thoroughly (United Nations Institute for Training and Research, 2013). This is why the UN is advocating for climate change education to become mandatory in schools starting in 2025, to better equip young people to deal potentially with climate change (https://www.weforum.org/agenda/2022/08/climate-change-schools-education).

Additionally, it is necessary to connect to and address particular priority groups with regard to understanding climate change, its science, implications, and response mechanisms. As a result, special programmes must be created and customised in accordance with age, school type and level, circumstances, and specific demands (UNITAR, 2013).

The qualitative result found that when sanctions are introduced in climate change communication, it could be improved. The reason ascribed was that the sanction will demonstrate the legal backing to check deviant behaviour among the youth. According to the findings, when legal backings are given to climate change communication through sanction, it will deter people from engaging in activities that degrade the environment. However, whether his argument holds true is debatable.

Climate change events that are dramatised events have also been suggested to improve climate change communication and instigate engagement. The reason alluded to drama is that people tend to understand it better than just passing the information. Drama can serve as a complementary, interconnecting

135

and arts-based approach for climate change education. Being distinct in the interrelated world of theatre, in a serious entertaining, embodied active and dialogical manner can enhance analytic viewpoints on the current social realities, inspire possible futures scenarios, and encourage change (Lehtonen, 2021). This according to the participant makes dramatised events effective and understandable and therefore, should be used in climate change communication.

The qualitative data again revealed that climate change communication must be tailored to a specific group and must go straight to the point. Presenting climate change information to persons and parties with varied contexts of power, agency, and social dynamics has proven difficult for climate change communicators (Lumosi & McGahey, 2016). In view of the above, it is important to know one's audience—what motivates them, what they value and what their constraints and barriers are and who they listen to and respect so the information can be tailored to their needs and ensure that salience to the issue is as high as possible (Howarth et al., 2020; Markowitz & Guckian, 2018). Where there is disagreement among a population on climate change, a study is required to determine which messaging and scientific findings are most appropriate for each audience, how to best engage each audience, and which sources each audience trusts (Holmes & Hall, 2019). Such message should be brief and straight to the point according to the participants. This is because lengthy talk results in little or no action (Somerville & Hassol, 2011).

Association Between Religion and Climate Change Causes

Given the widespread practice of religion around the globe, it is expected that religion would have a bearing on changing climate. Whether overt or implied,

136

varying religious frames of reference shape how various participating groups and cultural communities perceive the risk posed by climate change (Hulme, 2018). The notion of God as a deliberate being with the capacity to intervene in the natural world significantly influence the way people react to incidents in their surroundings (Shin, 2015). According to Wolf and Moser (2011), religious views can influence whether or not individuals acknowledge human beings as responsible for altering the Earth's natural weather or temperature. Perception of an intervening God leads to less climate change action because people delegate private onus to God. If one believes in God as an all knowing immortal who keenly participates in mortal matters, then combating global warming may appear to be under God's domain (Shin, 2015).

To validate the above assertions, the current study tested the relationship. The findings of the current study show there is a connection between religion and causes of climate change. This means that clinging to one's religious beliefs influences one's perceptions of whether or not humans are causing climate change. Believing in the intervention of a higher power can lead individuals to perceive their consumption behaviour as having no harmful consequences, and this limites the range of conceivable solutions (Shin, 2015). Although there is not a one-size-fits-all solution to the issue of climate change, pretending that religion has nothing to offer is extremely dire (Hulme, 2018).

Association Between Demographic Variables and Knowledge of Climate Change

The investigation into whether demographic characteristics influence respondents' awareness level revealed a significant connection between

137

respondents' awareness level and each independent variable of community, marital status, educational level, and religion. However, in terms of gender, occupation and age, no link was established between awareness level and the independent variables of gender, occupation, and age. Previous study has reported a significant connection between gender, occupation, age, and awareness or knowledge of climate change (Kabir et al., 2016). Consequently, the present research did not establish such a link. Being male or female, engaging in an occupation, or advancing in years are not always indicative of knowledge of global warming. In terms of educational level, there exists a relationship suggesting that education influences awareness of climate change, and this revelation validates Kabir et al. (2016). This suggests that as one attains a greater educational height, their understanding of climate change is likely to increase.

Summary

Concluding from the inquiry, there is a 15% awareness gap that must be bridged. The link between occupation, community, and global warming messaging perceptions alludes that whether or not individuals see the current climate change dissemination as effective, is determined by their occupations and the communities in which they live. The limited understanding of climate change is a result of barriers the public encounter in their uptake of the information. Such obstacles have impacted their adaptation negatively. Consequently, these barriers can be eliminated to better understand climate change when the suggestions put forth, are considered in future climate change dissemination.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Introduction

The aim of the research was to assess climate change communication strategies for effective adaptation. Five research objectives and two hypotheses guided the inquiry. The sample size was 420 randomly selected from four coastal communities. The simultaneous triangulation mixed method was adopted to carry out the study. Questionnaire, interview and focus group discussion guides were used to collect the data. Field data gathering took a period of one-and-half months which began in July and ended in August 2022. In addition to that, secondary data (rainfall and temperature) were obtained from the Ghana Meteorological Agency in Accra, Ghana. Quantitative data were analysed and presented in descriptive and correlational manner whereas textual data were analysed using thematic analysis. Trend analysis was used to analyse the rainfall and temperature data.

Major Findings

The enquiry examined current climate change communication for effective adaptation. The research revealed a greater climate change awareness among coastal communities of Ghana. The respondents had diverse channels through which they became aware of climate change. Although the respondents possessed some amount of knowledge of the weather, they could not situate it into the timeframe of climate change. Both data depicted that the respondents did not understand climate change and were confused with the meaning of climate change, causes, and consequences of climate change. However, the respondents

139

and participants maintained an ambivalent views about the causes of climate change. Whereas some believe climate change as human-caused, others considered climate change as an act of God and punishment for sins. One other finding was testing of atomic bombs and space exploration by scientists. The dominant perceptions of climate change impacts were lessening in rainfall and an increasing temperature. The study further depicted that community, marital status, educational level and religion were statistically significant in determining awareness of climate change whereas age, gender, and occupation were not.

In terms of predicting the relationship between demographic characteristics and perception of climate change communication, the binary logistic regression analysis showed that occupation, and community were important predictors of respondents' perceptions of climate change communication. It connotes that the type of occupation and the community in which people live determine their perceptions of whether or not climate change messaging is effective.

In identifying the barriers that militate against the public understanding of climate change, respondents acknowledged that certain barriers militate against their comprehension of climate change information. Some of these barriers that came out from the study include language barrier, information overload, problem of the channel used in disseminating climate change messages, illiteracy, wrong timing of information, poor reading attitudes among others.

The study also sought to explore how the barriers to public understanding of climate change have impacted coastal communities' ways of living. The

findings of the study showed that these barriers have led to limited knowledge on adaptation, no adaptation at all, destruction of properties due to unannounced disasters, and poor living conditions of the coastal dwellers.

The final objective examined ways by which climate change communication could be improved in order to improve public understanding. The results of the study revealed that climate change communication can be improved by public education, using local language, using different channels, communicating solutions, introducing climate change in the school curriculum, training of climate change communicators, tailoring climate change message to specific audience, introducing sanctions in climate change communication, dramatising climate change events, avoiding politics of climate change, and timely delivery of climate information.

Conclusions

The findings of the study showed high awareness level of climate change among communities along the coast. However, such level of awareness did not translate into knowledge and understanding of climate change, leading to a significant awareness gap that must be bridged. The Pearson's Chi-Square test refuted an earlier established link between awareness and gender, age, and occupation but maintained the link between education, community, marital status, religion and awareness of climate change. Hence, to boost awareness, climate change messaging should target education, communities, marital status, and religious groups. Again, the association between religion and recognised causes of climate change implies that the participation of faith-based institutions in the fight

141

against climate change will be substantial. The binary regression model predicted occupation and community as significant predictors of climate change communication perception. A more community level barriers to public understanding of climate change information were also discovered by the study. These barriers have affected the coastal communities negatively deteriorating their conditions of living. Finally, feasible suggestions have been revealed as to how future climate change communication could be improved in order to improve public understanding to spur the necessary engagement needed.

Recommendations

1. The study revealed that there is still awareness and perception gap among coastal communities in Ghana with 85% of awareness of climate change. In closing the awareness gap, the community information centres should be prioritised in climate change communication. A messaging approach must stimulate public engagement via participatory dialogue on climate change, as colleagues and relatives are the most trustworthy media, and such an approach would aid in bridging the 'perception gap'.

2. Future climate change communication should address the perceived barriers discovered in the study in order to improve knowledge and understanding, as understanding of an issue is also part of the solution. The knowledge and understanding will increase the sense of urgency with which climate change must be addressed.

3. The greatest method for disseminating information about climate science and its effects is to create concise messages that are frequently reiterated

142

to specific or broad audiences by reliable sources. It should go beyond to include translating the message into the audience's local language as well as prioritising indigenous languages in the communication.

4. In any targeted climate change communication strategy, research is needed to understand which messages and trusted sources those audiences care about. The audiences can range from sectoral to geographic or demographic.

5. Future climate change communication should target religion. This will help to disabuse the minds of people from believing in a higher invisible hand in climate change. The communication must also target the human-caused climate change and real-life solutions that can be tapped to remedy the situation.

6. Effective adaptation communication should highlight the fact that localised climate change is already evident and that persistent discussions are required for specific communities. Bringing climate change home helps to disabuse the minds of people from the distant perception of climate. Localising climate change shows a promise of instigating engagement.

7. The Ghana Meteorological Agency must enhance trust among locals by consistently providing accurate and timely weather forecasts, ensuring their predictions are communicated clearly and accessibly through various media channels. To address concerns about the reliability of predictions, the agency should transparently communicate the probability of their

forecasts, including the chances of specific weather events occurring or not occurring. Engaging with communities through educational outreach programmes to explain meteorological processes and the basis for their forecasts can further demystify their work. This will make local communities understand the agency's work as only to make predictions but not having control over their occurences. This can strengthen credibility and public confidence.

8. The study also recommends the involvement of NGOs in climate change awareness in coastal communities in Ghana as they are crucial in bringing expertise, resources, and grassroots connections essential for educating and empowering locals to adopt sustainable practices and enhance resilience against environmental impacts. Their active participation can drive community-led initiatives and ensure more effective and inclusive climate adaptation strategies.
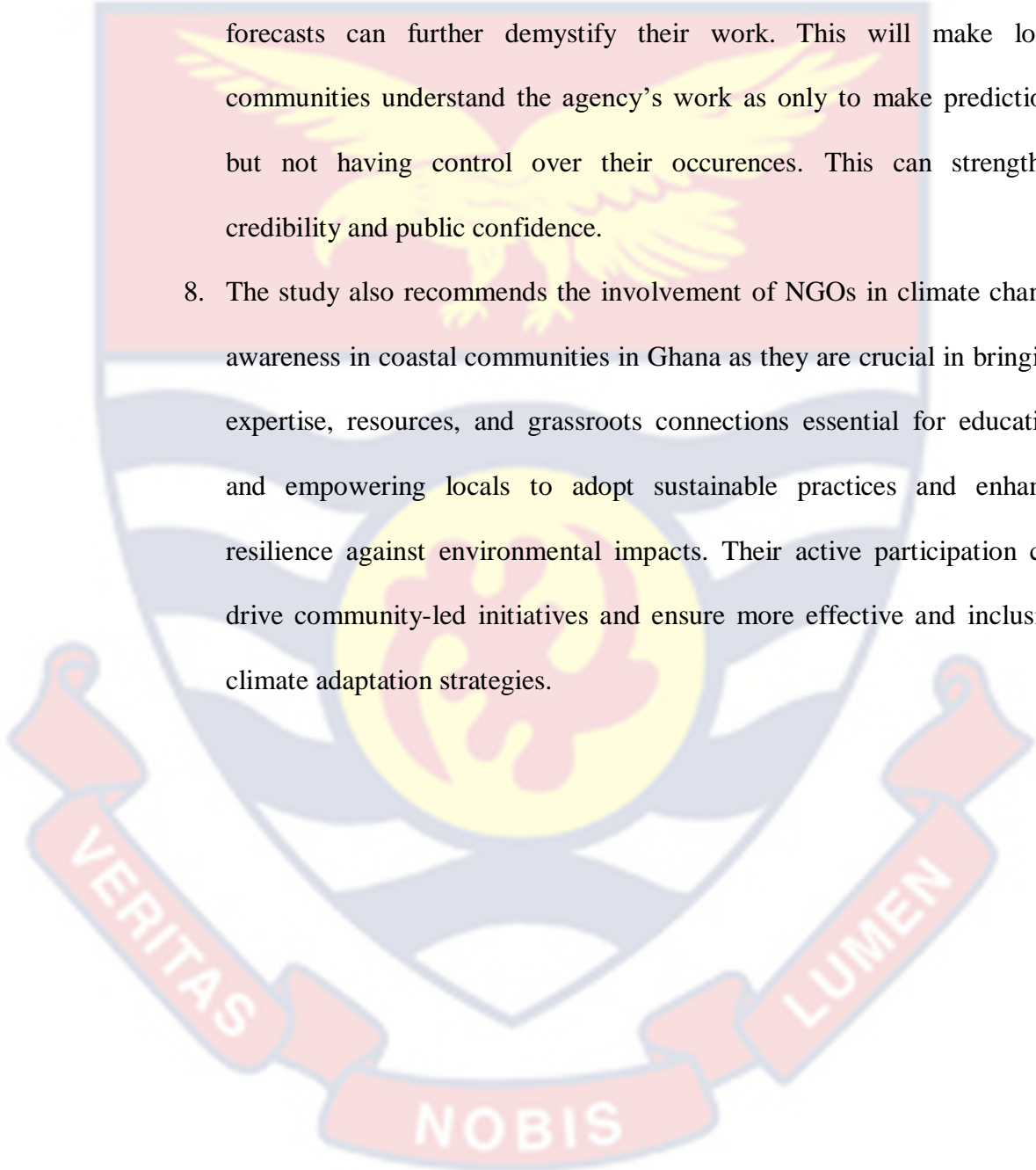
REFERENCES

Abrams, R. W., Abrams, J. F., & Abrams, A. L. (2017). Climate change challenges for Africa. *Encyclopedia of the Anthropocene*, *1–5*(April), 177–194. https://doi.org/10.1016/B978-0-12-809665-9.09754-8

Abuarqoub, I. A. S. (2019). Language barriers to effective communication. *Utopia y Praxis Latinoamericana*, *24*(Extra6), 64–77.

Acquah, H. D.-G. (2011). Public awareness and quality of knowledge regarding climate change in Ghana: A logistic regression approach. *Journal of Sustainable Development in Africa*, *13*(1), 87–107.

AfDB. (2012). *Solutions for a changing climate, The African development bank's response to impacts in Africa.* African Development Bank

Agbeko, P., Mattah, D., Futagbi, G., & Mattah, M. M. (2018). Awareness of environmental change, climate variability, and their role in prevalence of mosquitoes among urban dwellers in southern Ghana. *Journal of Environmental and Public Health*, *2018*.

Agbevivi, S. L. G. (2022). The state of reading in tertiary institutions: A pragmatic analysis of a Ghanaian university. *International Journal of English Language Teaching*, *10*(5), 12–29. https://doi.org/10.37745/ijelt.13/vol10n51229

Agyemang, B. K., Ngulube, P., & Dube, L. (2019). Utilising knowledge management methods to manage beads-making indigenous knowledge among the Krobo communities in Ghana. *SA Journal of Information Management*, *21*(1), 1–9. https://doi.org/10.4102/sajim.v21i1.1008

Aksit, O., McNeal, K. S., Gold, A. U., Libarkin, J. C., & Harris, S. (2018). The influence of instruction, prior knowledge, and values on climate change risk perception among undergraduates. *Journal of Research in Science Teaching*, *55*(4), 550–572. https://doi.org/10.1002/tea.21430

Akyeampong, E. (2007). Indigenous knowledge and maritime fishing in west Africa: The case of Ghana. *Indigenous Knowledge Systems and Sustainable Development: Relevance for Africa (Tribes and Tribals, Special Volume No. 1)*, *January 2007*, 173–182.

Alikhan, S. (2013). Farmers' perception on climate change. *Proceedings of the Third International Symposium*, *July (6-7)*. Oluvil, Sri Lanka.

Alvi, M. (2016). A manual for selecting sampling techniques in research. In *Munich Personal RePEc Archive* (Vol. 1, Issue 70218).

Aminah, S. (2016). The application of participatory communication of small farmers empowerment program. *Jurnal Bina Praja*, *8*(735), 135–148.

Anastasiadis, S. (2006). The big problem in understanding climate change. *Journal of Social Justice*, *2659*(2005). https://doi.org/10.1080/14631370500333039

Ankrah, J. (2020). Coastal community's perception on climate change and its impacts: Analysis of local Coastal community of Winneba, Ghana. *Asian Research Journal of Arts & Social Sciences*, *12*(1), 43–55. https://doi.org/10.9734/arjass/2020/v12i130183

Anne, K. A., Marianne, E. K. & Jonathon, P. S. (2018). *Communicating climate change: A guide for educators*. Comstock Publishing Associates.

146

Antwi-Agyei, P., Dougill, A. J., & Abaidoo, R. C. (2021). Opportunities and

   barriers for using climate information for building resilient agricultural

   systems in Sudan savannah agro-ecological zone of north-eastern Ghana.

   Climate Services, *22*, 100226. https://doi.org/10.1016/j.cliser.2021.100226

Appiah-Opoku, S. (2007). Indigenous beliefs and environmental stewardship: A

   rural Ghana experience. *Journal of Cultural Geography*, *24*(2), 79–98.

   https://doi.org/10.1080/08873630709478212

Arlt, D., Hoppe, I., Schmitt, J. B., De Silva-Schmidt, F., & Brüggemann, M.

   (2018). Climate engagement in a digital age: Exploring the drivers of

   participation in climate discourse online in the context of COP21.

   Environmental Communication, *12*(1), 84–98.

   https://doi.org/10.1080/17524032.2017.1394892

Asante, F. A., & Amuakwa-mensah, F. (2015). Climate change and variability in

   Ghana: Stocktaking. *Climate*, 78–99. https://doi.org/10.3390/cli3010078

Asekun-Olarinmoye, O, E., Odu, O. O., Olugbenga-bello, A. I., & Adeomi, A. A.

   (2014). Public perception of climate change and its impact on health and

   environment in rural southwestern Nigeria. *Research and Reports in

   Tropical Medicine*, 1–10.

Badullovich, N., Grant, W. J., & Colvin, R. M. (2020). Framing climate change

   for effective communication: A systematic map. *Environmental Research

   Letters*, *15*(12). https://doi.org/10.1088/1748-9326/aba4c7

Ballantyne, A.G., Wilbeck, V. & Neset, T. S. (2016). Climate change

   communication: what can we learn from communication theory? *Climate

Change, *October*. https://doi.org/10.1007/s10584-015-1533-9

Bardy, R., Arthur, R., & Helen, A. A. (2018). Combining indigenous wisdom and academic knowledge to build sustainable future: An example from rural Africa. *Journal of African Studies and Development*, *10*(2), 8–18. https://doi.org/10.5897/jasd2017.0481

Beard, C. (2012). *An exploration of communication strategies influencing public responses to climate change*. MSc Thesis: Colorado State University.

Biesta, G. (2010). Pragmatism and the philosophical foundations of mixed methods research. In A. Tashakkori & C. Taddlie (Eds.), *Sage Handbook of Mixed Methods in Social and Behabioral Research* (2nd ed., pp. 95-118). Thousand Oaks, CA: Sage

Bisht, H., & Ahluwalia, N. (2014). *Community radios and climate change communication : Mapping grassroots experiences of the 'Shubh Kal' project in Bundelkhand, Central India*. Development Initiative

Boadu, E. S., & Ile, I. (2018). The politics of youth participation in social intervention programmes in Ghana: Implications for participatory monitoring and evaluation (PM&E). *Journal of Reviews on Global Economics*, *7*(Special Issue), 913–925. https://doi.org/10.6000/1929-7092.2018.07.89

Boadu, E. S., Ile, I., & Oduro, M. Y. (2021). Indigenizing participation for sustainable community-based development programmes in Ghana. *Journal of Asian and African Studies*, *56*(7), 1658–1677. https://doi.org/10.1177/0021909620979333

Bolson, T., Palm, R., & Kingsland, Justin, T. (2019). The impacts of message

source on the effectiveness of communicatins about climate change. *Science Communication*, *1*(69), 5–24.

Boon, E., & Ahenkan, A. (2012). Assessing climate change impacts on ecosystem services and livelihoods in Ghana : Case study of communities around Sui Forest Reserve. *Journal of Ecosystem & Ecography*, 1–8. https://doi.org/10.4172/2157-7625.S3-001

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *0887*(2006), 77–101.

Braun, V., Clarke, V., & Weate, P. (2016). Using thematic analysis in sport and exercise research. In *Routledge handbook of qualitative research in sport and exercise* (pp. 191–205). London: Routledge.

Brown-Addo, N. (2012). *Participatory communication for economic empowerment of business sector advocacy challenge (BUSAC) fund grantees*. MA Dissertation: University of Ghana.

Bruine de Bruin, W., Rabinovich, L., Weber, K., Babboni, M., Dean, M., & Ignon, L. (2021). Public understanding of climate change terminology. In *Climatic Change* (Vol. 167, Issues 3–4). https://doi.org/10.1007/s10584-021-03183-0

Burton, M., Godfrey, A., & LeRoux-Rutledge, E. (2012). "Africa talks climate." *The Handbook of Global Media Research*, 504–520. https://doi.org/10.1002/9781118255278.ch29

California Coastal Commission. (2015). *Sea level rise policy guidance: Interpretive guidelines for addressing sea level rise in local coastal*

programs and coastal developments permits. San Fransisco: California

Coastal Commission. Retrieved from

www.coastal.ca.gov/climate/elrguidance.html

Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N., & Upham, P. (2015).

International trends in public perceptions of climate change over the past

quarter century. *Wiley Interdisciplinary Reviews: Climate Change*, *6*(1), 35–

61. https://doi.org/10.1002/wcc.321

Carmin, J. (2012). Climate change: Urban impacts and responses. *The Wiley-

Blackwell Encyclopedia of Globalization*.

https://doi.org/10.1002/9780470670590.wbeog076

Carson, S. L., Kentatchime, F., Nana, E. D., Njabo, K. Y., Cole, B. L., & Godwin,

H. A. (2018). Indigenous peoples' concerns about loss of forest knowledge:

Implications for forest management. *Conservation and Society*, *16*(4), 431–

440. https://doi.org/10.4103/cs.cs_17_105

Chadwick, A. E. (2017). Climate change communication. In *Oxford Research

Encyclopedias* (Issue September 2017, pp. 1–27).

Chari, T. (2016). Rethinking climate change communication strategies in Africa:

The case for indigenous media. *Indilinga African Journal of Indigenous

Knowledge Systems*, *15*(2), 217–232.

Chen, Y. L. (2018). Language barriers among Taiwanese national champions.

Higher Education Studies, *9*(1), 63. https://doi.org/10.5539/hes.v9n1p63

Cobley, P., & Schulz, P. J. (2013). Theories and models of communication. In

Handbook of Communication Science. De Gruyter Mouton.

Codjoe, F. N. Y., Ocansey, C. K., Boateng, D. O., & Ofori, J. (2013). Climate

change awareness and coping strategies of cocoa farmers in rural Ghana.

Journal of Biology, Agriculture and Healthcare, *3*(11), 19–30.

Codjoe, S. N. A., Owusu, G., & Burkett, V. (2014). Perception, experience, and

indigenous knowledge of climate change and variability: The case of Accra,

a sub-saharan African city. *Regional Environmental Change*, *14*(1), 369–

383. https://doi.org/10.1007/s10113-013-0500-0

Coker, W., & Ngula, R. S. (2020). The black hole in science journalism: A study

of journalism students ' accommodation strategies of scientific writing.

Journal of Humanities, *31*(2020), 1–32.

Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing

misinformation through inoculation: Exposing misleading argumentation

techniques reduces their influence. *PLOS*, 1–21.

https://doi.org/10.5061/dryad.f17j3.Funding

Corner, A., & Clarke, J. (2014). *Communicating climate change adaptation: A

practical guide to values-based communication*. Cape Town: Climate

Outreach.

Corner, A., & Clarke, J. (2017). *Communicating climate change adaptation: A

practical guide to values-based communication*. Cape Town: Climate

Outreach.

Corner, A., Shaw, C., & Clarke, J. (2018). *Principles for effective communication

and public engagement on climate change: A handbook for IPCC authors*

Oxford: Climate Outreach.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3 eds). SAGE Publications, Inc.

Crona, B., Wutich, A., Brewis, A., & Gartin, M. (2013). Perceptions of climate change: Linking local and global perceptions through a cultural knowledge approach. *Climatic Change*, *119*(2), 519–531. https://doi.org/10.1007/s10584-013-0708-5

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, *2*(2), 25–36. https://doi.org/10.46809/jpse.v2i2.20

de Bruin, W., & Bostrom, A. (2013). Assessing what to address in science communication. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(SUPPL. 3), 14062–14068. https://doi.org/10.1073/pnas.1212729110

Denchak, M., & Turrentine, J. (2021) *Global climate change: What you need to know*. Retrieved on July, 2022 from nrdc.org/stories/global_climate_change_what_you_need_to_know.

den Elzen, M., Kuramochi, T., Höhne, N., Cantzler, J., Esmeijer, K., Fekete, H., Fransen, T., Keramidas, K., Roelfsema, M., Sha, F., van Soest, H., & Vandyck, T. (2019). Are the G20 economies making enough progress to meet their NDC targets? *Energy Policy*, *126*(January 2018), 238–250. https://doi.org/10.1016/j.enpol.2018.11.027

Denzin, N. K. (2010). Moments, mixed methods, and paradigm dialogs. *Qualitative Inquiry*, *16*(6), 419–427.

https://doi.org/10.1177/1077800410364608

Denzin, N. K. (2012). Triangulation. *Journal of Mixed Methods Research*.

https://doi.org/10.1177/1558689812437186

Derbile, E. K. (2013). Reducing vulnerability of rain-fed agriculture to drought

through indigenous knowledge systems in north-eastern Ghana. *International*

Journal of Climate Change Strategies and Management, *5*(1), 71–94.

https://doi.org/10.1108/17568691311299372

Dixon, G., & Hubner, A. (2018). Neutralizing the effect of political worldviews

by communicating scientific agreement: A thought-listing study. *Science*

Communication, *40*(3). https://doi.org/10.1177/1075547018769907

Dreyfus, M. (2013). Adaptation to climate change in the cities. *Handbook of*

Climate Change Adaptation, 1–17. https://doi.org/10.1007/978-3-642-40455-

9

Druckman, J. N. (2001). The implications of framing effects for citizen

competence. *Political Behavior*, *23*(3), 225–256.

https://doi.org/10.1023/A:1015006907312

Duper, M., McNamara, L., & Pacha, M. (2019). *Communicating climate change:*

A practitioner's guide. Insights from Africa, Asia and Latin America.

Climate Development Knowledge Network.

Eichhorn, J., Molthof, L., & Nicke, S. (2020). *From climate change awareness to*

climate crisis action: Public perceptions in Europe and the United States.

Open Foundation Society.

Encyclopedia Britannica. (2016). Two-step flow model of communication.

Encyclopedia of Political Communication, 3–5.

https://doi.org/10.4135/9781412953993.n676

EPA. (2018). *Ghana's national adaptation plan* (Issue October). Environmental

Protection Agency.

Etikan, I. (2017). Sampling and sampling methods. *Biometrics & Biostatistics*

International Journal, *5*(6), 215–217.

https://doi.org/10.15406/bbij.2017.05.00149

Evans, H., Dyll, L., & Teer-tomaselli, R. (2018). Communicating climate change:

Theories and perspectives. In *W. Leal Filho et al. (eds.)*, *Handbook of*

Climate Change Communication: Practice of Climate Change

Communication, Vol. 1, pp. 107-121. https://doi.org/10.1007/978-3-319-

69838-0_7

Fagariba, C. J., Song, S., & Baoro, S. K. G. S. (2018). Climate change adaptation

strategies and constraints in northern Ghana: Evidence of farmers in Sissala

West District. *Sustainability (Switzerland)*, *10*(5), 1–18.

https://doi.org/10.3390/su10051484

FAO. (2008). Climate change impacts on forest health. *Forest Health and*

Biosecurity Working Papers (FAO), 45.

Feldman, L., Nisbet, M., Leiserowitz, A. and Mailbach, E. (2010), "The climate

generation? Survey analysis of the perceptions and beliefs of young

Americans". Yale Project on Climate Change and Center for Climate Change

Communication, Yale University and George Mason University.

Filho, W. L. (2014). Communicating climate change: challenges ahead and action

needed. *International Journal of Climate Change Strategies and Management*, *January*. https://doi.org/10.1108/17568690910934363

Filho, W. L. (2019). *An overview of the challenges in climate change communication across various audiences*. Springer International Publishing. https://doi.org/10.1007/978-3-319-98294-6

Foss, A. W., & Ko, Y. (2019). Barriers and opportunities for climate change education: The case of Dallas-Fort Worth in Texas. *Journal of Environmental Education*, *50*(3), 145–159. https://doi.org/10.1080/00958964.2019.1604479

Fridy, K. S., & Myers, W. M. (2019). Challenges to decentralisation in Ghana: where do citizens seek assistance? *Commonwealth and Comparative Politics*, *57*(1), 71–92. https://doi.org/10.1080/14662043.2018.1514217

Glaas, E., Ballantyne, A. G., Neset, T., Linnér, B., Navarra, C., Johansson, J., Opach, T., Rød, J. K., & Goodsite, M. E. (2015). Facilitating climate change adaptation through communication : Insights from the development of a visualization tool. *Energy Research & Social Science*, *10*, 57–61. https://doi.org/10.1016/j.erss.2015.06.012

Government of Canada. (2019). *Causes of climate change*. Retrieved on November 2021 from: canada.ca/en/environment-climate-change/services/climate-change/causes.html

Greenhalgh, T. (2011). *Assessing a combined theories approach to climate change communication.* Greenspun College of Urban Affairs. University of Nevada, Las Vegas.

GSS. (2021). *Ghana Statistical Service 2021 Population and Housing Census Press Release*. Ghana Statistical Service.

Guenther, L., Weingart, P., & Joubert, M. (2018). Bridging the gap – mapping science, health and technology coverage in South Africa. In M. W. Bauer, P. Pansegrau, & R. Shukla (Eds.), *The cultural authority of science. Comparing across Europe, Asia, Africa and the Americas* (pp. 122–136). Routledge.

Guri, E. A. I., Osumanu, I. K., & Bonye, S. Z. (2021). Eco-cultural tourism development in Ghana: potentials and expected benefits in the Lawra Municipality. *Journal of Tourism and Cultural Change*, *19*(4), 458–476. https://doi.org/10.1080/14766825.2020.1737095

Hafner, R., Elmes, D., & Read, D. (2019). Exploring the role of messenger effects and feedback frames in promoting uptake of energy-efficient technologies. *Current Psychology*, *38*(6), 1601–1612. https://doi.org/10.1007/s12144-017-9717-2

Hansen, A., Wei, J., Hansen, A., Zhang, Y., Li, H., & Liu, Q. (2014). Perception, attitude and behavior in relation to climate change : A survey among CDC health professionals in Shanxi province, China. *Environmental Research*, *134*(October), 301–308. https://doi.org/10.1016/j.envres.2014.08.006

Haq, S. M. A., & Ahmed, K. J. (2017). Does the perception of climate change vary with the socio-demographic dimensions? A study on vulnerable populations in Bangladesh. *Natural Hazards*, *85*(3), 1759–1785. https://doi.org/10.1007/s11069-016-2664-7

Hasan, Z. (2015). *Artisan fishers' perceptions of, and adaptation to climate*

change in the southeast coast of Bangladesh. PhD Thesis: University of Adelaide.

Hens, L. (2006). Indigenous knowledge and biodiversity conservation and management in Ghana. *Journal of Human Ecology*, *20*(1), 21–30. https://doi.org/10.1080/09709274.2006.11905897

Herzog, C., Handke, C., & Hitters, E. (2019). Analyzing talk and text II: Thematic analysis. *The Palgrave Handbook of Methods for Media Policy Research*. Basingstoke: Palgrave, Macmillan.

Hlalele, D. J. (2019). Indigenous knowledge systems and sustainable learning in rural South Africa. *Australian and International Journal of Rural Education*, *29*(58), 36–40. https://doi.org/10.1177/019263653501905810

Holmes, A. D., & Hall, S. (2019). *A literature review of best practice communication of climate science and impacts: Guide for policy makers.* Monash Climate Change Communication Research HUb, Melbourne.

Hornsey, M. J., Harris, E. A., Bain, P. G., & Fielding, K. S. (2016). Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Climate Change*, *6*(6), 622–626. https://doi.org/10.1038/nclimate2943

Howarth, C., Parsons, L., & Thew, H. (2020). Effectively communicating climate science beyond academia: Harnessing the heterogeneity of climate knowledge. *One Earth*, *2*(4), 320–324. https://doi.org/10.1016/j.oneear.2020.04.001

Hulme, M. (2018). Climate change and the significance of religion. *Economic and Political Weekly*, July 2017 (vol. *28*), pp. 14-17

ICLEI. (2011). *Climate communication for local governments*. USA Local

    Government for Sustainability

Ifukor, M. O. (2013). Channels of information acquisition and dissemination

    among rural dwellers. *International Journal of Library Information Science*,

    5(10), 306–312. https://doi.org/10.5897/IJLIS11.036

Igwenagu, C. (2017). *Fundamentals of research methodology and data collection*.

    Enugu State University of science and Technology.

IPCC. (2007). Climate change 2007: Synthesis report. Contribution of working

    groups I, II, and III to the fourth assessment report of the Intergovernmental

    Panel on Climate Change [Core writing team, Pachauri, RK and Reisinger,

    A. (eds.)]. In *Intergovernmental Panel on Climate Change*.

    https://doi.org/10.1038/446727a

Islam, A., Munir, S., Bashar, A., & Sumon, K. A. (2021). Climate change and

    anthropogenic interferences for the morphological changes of the Padma

    River in Bangladesh. *American Journal of Climate Change*, 167–184.

    https://doi.org/10.4236/ajcc.2021.102008

Jackline, M. (2017). *The influence of participatory communication in promoting*

    accountability and transparency of constituency development fund in

    Emurua Dikirr Constituency. Nairobi University.

Jackson, S. T. (2021). Climate change. In *Encyclopedia Britannica*. Encyclopedia

    Britannica, Inc.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition

    of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112–

133. https://doi.org/10.1177/1558689806298224

Jones, C., Hine, D. W., & Marks, A. D. G. (2016). The future is now: Reducing

psychological distance to increase public engagement with climate change.

Risk Analysis. https://doi.org/10.1111/risa.12601

Jooste, J. (2014). *The nature of participatory communication between*

stakeholders of the bhive university incubator. North-West University.

Kabir, I., Rahman, B., Smith, W., Afreen, M., Lusha, F., Azim, S., & Milton, A.

H. (2016). Knowledge and perception about climate change and human

health: findings from a baseline survey among vulnerable communities in

Bangladesh. *BMC Public Health*, 1–10. https://doi.org/10.1186/s12889-016-

2930-3

Kaplan, R. J. (2019). Breaking through the language barrier. *American*

Sociological Association, *27*(6), 278–281.

Karikari, T. K., Yawson, N. A., & Quansah, E. (2016). Developing science

communication in Africa: Undergraduate and graduate students should be

trained and actively involved in outreach activity development and

implementation. *Journal of Undergraduate Neuroscience Education*.

Khan, Z. A., & Nawaz, A. (2020). Impact of climate change awareness on climate

change adaptions and climate change adaptation issues. *Pakistan Journal of*

Agricultural Research, 33 (3): 619-636.

https://doi.org/10.17582/journal.pjar/2020/33.3.619.636

Khatibi, F. S., Dedekorkut-Howes, A., Howes, M., & Torabi, E. (2021). Can

public awareness, knowledge and engagement improve climate change

adaptation policies? *Discover Sustainability*, 24.

Kothari, C. R. (2004). *Research methodology, methods and techniques* (2nd Ed.). New Age International Publishers.

Kroll, T., & Morris, J. (2009). Challenges and opportunities in using mixed method designs in rehabilitation research. *Archives of Physical Medicine and Rehabilitation*, *90*(11 SUPPL. 1), S11–S16. https://doi.org/10.1016/j.apmr.2009.04.023

Kulabako, I. (2006). *Part two: Participatory communication in development and humanitarian contexts*. In *Community Video for Social Change: A Toolkit, Uganda*

Larson, S. (2019). Understanding barriers to social adaptation: Are we targeting the right concerns ? *Architectural Science Review*, *February 2010*. https://doi.org/10.3763/asre.2009.0103

Leggett, J. A. (2018). *Evolving assessments of human and natural contributions to climate change*. Congressional Research Service.

Lehtonen, A. (2021). *Drama as an interconnecting approach for climate change education* (Issue 118). Dissertation: University of Helsinki.

Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, *77*(1–2), 45–72. https://doi.org/10.1007/s10584-006-9059-9

Leiserowitz, A. (2007). International public opinion, perception, and understanding of global climate change. In *Human Development Report 2007/2008*, 3(1).

https://core.ac.uk/download/pdf/6248846.pdf%0Ahttp://www.climateaccess.org/sites/default/files/Leiserowitz_International Public Opinion.pdf

Leiserowitz, A., Smith, N. & Marlon, J. R. (2015). Americans' knowledge of climate change. Yale University. New Haven, CT: Yale Project on Climate Change Communication.

Leiserowitz, A., Maibach, E., Roser-Renouf, C., Rosenthal, S., Cutler, M., & Kotcher, J. (2018). *Climate change in the american mind*. March: 2018. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication.

Leiserowitz, A., Roser-Renouf, C., Marlon, J., & Maibach, E. (2021). Global warming's six Americas: a review and recommendations for climate change communication. *Current Opinion in Behavioral Sciences*, *42*, 97–103. https://doi.org/10.1016/j.cobeha.2021.04.007

Li, N., & Su, L. Y. (2018). Message framing and climate change communication: A meta-analytical review. *Jurnal of Applied Communications*, *102*(3).

Lois, M. (2014). *Effects of child abuse on academic performance in public primary schools in Waia Division, Mboni East District.* University of Nairobi.

Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic Change*, *77*(1–2), 73–95. https://doi.org/10.1007/s10584-006-9072-z

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy

implications. *Global Environmental Change*, *17*(3–4), 445–459.

https://doi.org/10.1016/j.gloenvcha.2007.01.004

Lumosi, C., & McGahey, D. (2016) Communicating climate change for

adaptation: Challenges, successes and future and priorities. *Information brief*,

July. Available at: https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/

10625/57702/IDL-57702.pdf (accessed 12 October 2016).

Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-

by-step guide for learning and teaching scholars. *All Ireland Journal of

Teaching and Learning in Higher Education*, *3*(3), 3352–33514.

Mahl, D., Guenther, L., Schäfer, M. S., Meyer, C., & Siegen, D. (2020). "We are

a bit blind about it ": A qualitative analysis of climate change-related

perceptions and communication across South African communities".

Environmental Communication, *14*(6), 802–815.

https://doi.org/10.1080/17524032.2020.1736116

Mannar, I. S. (2014). Communicating climate change using community radios.

Journal of Biodiversity, Bioprospecting and Development, *1*(1), 1–6.

https://doi.org/10.4172/2376-Page

Markowitz, E., Hodge, C., & Harp, G. (2014). *Connecting on climate: A guide to

effective climate change communication*. Center for Research on

Environmental Decisions: Earth Institute, Columbia University.

http://www.connectingonclimate.org/

Markowitz, E. M., & Guckian, M. L. (2018). Climate change communication:

Challenges, insights, and opportunities. In *Psychology and Climate Change*

(Issue Ccc). Elsevier Inc. https://doi.org/10.1016/B978-0-12-813130-5.00003-5

Mbah, M. (2019). Can local knowledge make the difference? Rethinking universities' community engagement and prospect for sustainable community development. *Journal of Environmental Education*, *50*(1), 11–22. https://doi.org/10.1080/00958964.2018.1462136

Mbakogu, I. (2015). Addressing the relevance of indigenous communication to communicating for development. *International Journal of Scientific Footprints*, *3*(2), 1–14.

Mcbean, G. A., Hengeveld, H. G., & Service, M. (2000). Communicating the science of climate change: A mutual challenge for scientists and educators. *Canadian Journal of Environmental Education*, 9–23.

McClendon, M. (2015). *Assessing the effectiveness of a climate change communication intervention: An experimental study*. Thesis: The Ohio State University.

McDivitt, P. (2016). *The information deficit model is dead. Now what? Evaluating new strategies for communicating anthropogenic climate change in the context of contemporary American politics, economy, and culture*. MA Thesis: Saint John's University

Mcgahey, D. J., & Lumosi, C. (2018). Climate change communication for adaptation: Mapping communication pathways in semi-arid regions to identify research priorities. *Journal of Sustainable Development in Africa*, *20*(1), 87–107.

Mcnaught, R., & Warrick, O. (2014). Communicating climate change for

adaptation in rural communities: A Pacific study. *Regional Environment*

Change. https://doi.org/10.1007/s10113-014-0592-1

McPhail, T. L. (2009). The roles of non-governmental organizations (NGOs). In

Development Communication: Reframing the Role of the Media.

https://doi.org/10.1002/9781444310740.ch4

Mefalopulos, P. (2003). Theory and practice of participatory communication: The

case of the FAO project "Communication for Development in Southern

Africa." *ProQuest Dissertations and Theses*, 306.

https://search.proquest.com/dissertations-theses/theory-practice-

participatory-communication-case/docview/305295507/se-

2?accountid=41849

Mensah, E. (2018). *Perceptions and adaptation strategies of rice farmers to*

climate change in Adaklu District, Ghana. MPhil Thesis: University of

Ghana. http://ugspace.ug.edu.gh

Merner, C. (2017). *The psychology of effective climate change communication: A*

discourse analysis. Dalhousie University.

Merzdorf, J., & Pfeiffer, L. J. (2019). Heated discussion: Strategies for

communicating climate change in a polarized era. *Journal of Applied*

Communications, *103*(3).

Metag, J., Füchslin, T., & Schäfer, M. S. (2017). Global warming's five

Germanys: A typology of Germans' views on climate change and patterns of

media use and information. *Public Understanding of Science*, *26*(4), 434–

451. https://doi.org/10.1177/0963662515592558

Met Office (2019). *Causes of climate change*. Retrived on November 2021 from https//www.metoffice,gov.uk/weather/climate-change/causes-of-climatechange.

MoFA. (2018). *Climate change profile: Ghana*. Ministry of Foreign Affairs of the Netherlands.

Monroe, M. C., Bode, C. L., & Megalos, M. A. (2017). Challenges in communicating climate change to extension audiences. *FOR324*, 1–5.

Moser, S. C. (2010). *Communicating climate change: History, challenges, process and future directions*. John Wiley & Sons, Ltd. https://doi.org/10.1002/wcc.011

Moser, S. C., & Dilling, L. (2012). Communicating climate change: Closing the science-action gap. *The Oxford Handbook of Climate Change and Society*, *March 2022*, 1–18. https://doi.org/10.1093/oxfordhb/9780199566600.003.0011

Mostak, K., & Hoq, G. (2014). Information overload, causes, consequences and remedy: A study. *Philosophy and Progress*, *2278*, 50-68 http://dx.doi.org/10.3329/pp.v55i1-2.26390

Mugenda, O., & Mugenda, A. G. (2010). *Research methods: quantitative and qualitative approaches*. Nairobi: Acts Press.

Mulder, P. (2018). Lasswell communication model. Retrieved [3rd November, 2022] from Toolshero: https://www.toolshero.com/communication-methods/lasswell-communication-model/

Müller-Kuckelberg, K. (2012) *Climate change and its impact on the livelihood of farmers and agricultural workers in Ghana*. *July*, 1–47. General Agriculture Workers' Union of GTUC, Ghana Office.

Murphy, P. D., & Tinga, T. M. (2019). Communication for development and social change and the challenge of climate change. *International Journal of Communication*, *13*, 1252–1270.

Musheke, M. M., & Phiri, J. (2021). The effects of effective communication on organizational performance based on the systems theory. *Open Journal of Business and Management*, *09*(02), 659–671. https://doi.org/10.4236/ojbm.2021.92034

Mutimukuru-Maravanyika, T., Mills, D. J., Asare, C., & Asiedu, G. A. (2017). Enhancing women's participation in decision-making in artisanal fisheries in the Anlo Beach fishing community, Ghana. *Water Resources and Rural Development*, *10*(May), 58–75. https://doi.org/10.1016/j.wrr.2016.04.001

Ndamani, F., & Watanabe, T. (2015). Farmers' perceptions about adaptation practices to climate change and barriers to adaptation: A micro-level study in Ghana. *Water*, 4593–4604. https://doi.org/10.3390/w7094593

Ndinde, S., & Kadodo, W. (2014). The role of community-based information centers in development: Lessons for rural Zimbabwe. *International Journal of Learning, Teaching and Educational Research*, *2*(1), 44–53.

Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *Advanced Review*. John Wiley & Sons Ltd https://doi.org/10.1002/wcc.002

Neville, L., & Mohammed, A. (2010). *Ghana talks climate*. BBC World Service

Trust.

Nigel, S., & Dan, J. (2017). *Quantitative and qualitative methods.* (pp. 1–6).

Intrac for civil society.

Noble, H., & Heale, R. (2019). Triangulation in research, with examples.

Evidence-Based Nursing, *22*(3), 67–68. https://doi.org/10.1136/ebnurs-2019-

103145

Nwankwoala, H. N. L. (2015). Causes of climate and environmental changes: The

need for environmental-friendly education policy in Nigeria. *Journal of

Education and Practice*, *6*(30), 224–234.

Odonkor, S. T., Dei, E. N., & Sallar, A. M. (2020). Knowledge, attitude, and

adaptation to climate change in Ghana. *Hindawi: The Scientific World

Journal*, *2020*. https://doi.org/10.1155/2020/3167317

O'Donoghue, R., Kibuka-Sebitosi, E., Tshiningayamwe, S., & Palmer, C. (2019).

Navigating non-sense by exemplifying situated life experience and

intergenerational heritage knowledge in education for sustainable

development learning spaces. *Southern African Journal of Environmental

Education*, *35*(1), 1–18. https://doi.org/10.4314/sajee.v35i1.8

Ofori-Birikorang, A. & Aggrey, K. (2018). Horns over roofs: A study of locally

designed rural information dissemination technology centres in Ghana. In

IUCDS/CIUED- *Journal of Research Findings/Revue des Resultats de

Recherche*, 1(2), 293-321

Ogunbode, T. O., Odekunle, D., & Asifat, J. T. (2019). Climate change awareness

and its determinants in a growing city in the southwestern Nigeria using Multivariate Analysis. *Journal of Environmental Sustainability*, *7*(1), 15-27

Ohene-Asante, S. N. A. A. (2015). *Climate change awareness and risk perception in Ghana: A case study of communities around the Muni-Pomadze ramsar site.* MPhil Thesis: University of Ghana. https://ugspace.ug.edu.gh

Onoja, U. S., & Enete, A. A. (2011). Climate change : Causes, effects and mitigation measures-A review. *Global Journal of Pure and Applied Sciences*, *17*(4), 469–479.

Osae-Addo, M. (2015). *A study of the communication strategies of the Agona East District Assembly*. MA Dissertation: University of Ghana. http://ugspace.ug.edu.gh

Owusu Nsiah, I. (2020). An epoch of nadiral readership: Encouraging the reading culture in Africa–the Ghana case. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3608425

Painter, J. (2014). *Disaster averted? Television coverage of the 2013/14 IPCC's climate change reports*. Reuters Institute for the Study of Journalism.

Pelt, S. C. Van. (2014). *Assessing and communicating climate change uncertainties-Case of the Rhine basin*. Wageningen University.

Pelzer, K., Stebbins, J. F., Prinz, F. B., Borisov, A. S., Hazendonk, P., Hayes, P. G., Abele, M., Nmr, S., York, N., Santibáñez-Mendieta, A. B., Didier, C., Inglis, K. K., Corkett, A. J., Pitcher, M. J., Zanella, M., Shin, J. F., Daniels, L. M., Rakhmatullin, A., Li, M. M., … Society, C. (2017). The nexus between the perception of climate change and disciplinary backgrounds

among university students in Bangladesh. *Solid State Ionics*, *2*(1), 1–10.
http://linkinghub.elsevier.com/retrieve/pii/S0167273817305726%0Ahttp://dx
.doi.org/10.1038/s41467-017-01772-1

Perrault, S. T. (2013). *Communicating popular science: From deficit to democracy*. Palgrave: Macmillan. https://doi.org/10.1057/9781137017581

Pickson, R. B. (2021). Smallholder farmers' perceptions, adaptation constraints and determinants of adaptive capacity to climate change in Chengdu. *Sage Open*. https://doi.org/10.1177/21582440211032638

Pipaş, M. D., & Jaradat, M. (2011). Communication barriers. *Journal of English Lnaguage and Literature*, *12*(SUPPL. 2), 333–336. https://doi.org/10.1080/03073289.1978.10805425

CESDP. (2006). Teacher tools module 1: Improving communication. In *Centre for the Education and Study of Diverse Populations* (p. 44). http://www.cesdp.nmhu.edu/toolkit/improving-communication/one-to-twoway-communication.asp

Prasad, R. R. (2021). University students' perceptions of climate change : The case study of the university of the South Pacific-Fiji Islands. *Emerald Insight*. https://doi.org/10.1108/IJCCSM-12-2020-0126

Rogelj, J., Popp, A., Calvin, K. V, Luderer, G., & Emmerling, J. (2018). *Scenarios towards limiting global-mean temperature increase below 1.5° C*. *Nature Climate Change* 8, 325–32

Romsdahl, R. J. (2020). Deliberative framing: opening up discussions for local-level public engagement on climate change. In *Climatic Change* (Vol. 162,

Issue 2, pp. 145–163). https://doi.org/10.1007/s10584-020-02754-x

Roser-Renouf, C., Maibach, E., Leiserowitz, A., & Rosenthal, S. (2016). *Global warming, God, and the "end times"*: March, 2016. (pp. 1–21). New Haven, CT: Yale Program on Climate Change Communication. Yale University and George Mason University.

Sadiku, M. N. O., Shadare, A. E., & Musa, S. M. (2016). Information overload: Causes and cures. *Journal of Multidisciplinary Engineering Science and Technology*, *May*, 2–5.

Sampei, Y., & Aoyagi-Usui, M. (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, *19*(2), 203–212. https://doi.org/10.1016/j.gloenvcha.2008.10.005

Samuel, O. O., Micheal, A., & Nkonki-Mandleni, B. (2018). Determinants of climate change awareness among rural farming households in South Africa. *Journal of Economics and Behavioral Studies*, *10*(5(J)), 116–124. https://doi.org/10.22610/jebs.v10i5(j).2502

Sarfo, I., Dontoh, J. I., & Otchwemah, H. B. (2019). Awareness and vulnerability to climate change among coastal communities in Ghana: The case of Dansoman of the Greater Accra Region. *Current Journal of Applied Science and Technology*, *32*(1), 1–14. https://doi.org/10.9734/CJAST/2019/45659

Sayers, R. (2006). *Principles of awareness-raising for information literacy: A case study* (pp. 1–114). UNESCO.

http://unesdoc.unesco.org/images/0014/001476/147637e.pdf

Schuldt, J. P., Rickard, L. N., & Yang, Z. J. (2018). Does reduced psychological

distance increase climate engagement ? On the limits of localizing climate

change. *Journal of Environmental Psychology*, *55*, 147–153.

https://doi.org/10.1016/j.jenvp.2018.02.001

Sekyi, J. (2021). *Adaptive responses of small-scale fisheries to the vulnerabilities*

resulting from crude oil extraction in western Ghana. Master's Thesis:

University of Waterloo.

Selormey, B. E. E., Dome, M. Z., Osse, L., & Logan, C. (2019). Change ahead of

climate change in Africa. *Afrobarometer Policy Paper No.*, *60*(60), 1–28.

http://afrobarometer.org/sites/default/files/publications/Policy

papers/ab_r7_policypaperno60_experience_and_awareness_of_climate_chan

ge_in_africa.pdf

Shahid, Z. (2012). Climate change awareness and adaptation by local planning in

Punjab, Pakistan. *PQDT - Global*, *July*, 214.

http://ezproxy.unal.edu.co/docview/1949330420?accountid=137090

Shanahan, M. (2009). Time to adapt? Media coverage of climate change in

nonindustrialised countries. *Climate Change and the Media*, 145–157.

Shannon-baker, P. (2016). Making paradigms meaningful in mixed methods

research. *Journal of Mixed Methods Research*.

https://doi.org/10.1177/1558689815575861

Shi, J., Visschers, V. H. M., Siegrist, M., & Arvai, J. (2016). Knowledge as a

driver of public perceptions about climate change reassessed. *Nature Climate*

Change, *6*(8), 759–762. https://doi.org/10.1038/nclimate2997

Shin, F. (2015). *God will take care of it: How belief in an intervening God decreases concern for climate change*. MA Thesis: University of Illinois.

Showkat, N., & Parveen, H. (2017). *Non-probability and probability sampling*. Media and Communication Studies.

Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *Public Understanding of Science*, *25*(4), 400–414. https://doi.org/10.1177/0963662516629749

Singh, C., Iyer, S., New, M. G., Few, R., Kuchimanchi, B., Segnon, A. C., & Morchain, D. (2021). Interrogating 'effectiveness' in climate change adaptation: 11 guiding principles for adaptation research and practice. *Climate and Development*, *0*(0), 1–15. https://doi.org/10.1080/17565529.2021.1964937

Siyao, P. O. (2021). Sources of climate change information used by newspaper journalists in Tanzania. *International Federation of Library Associations and Institutions*, *47*(1), 5–19. https://doi.org/10.1177/0340035220985163

Somerville, R. C. J., & Hassol, S. J. (2011). Communicating the science of climate change. *Physics Today*, *48–53*.

Sraku-Lartey, M., Buor, D., Adjei, P. O. W., & Foli, E. G. (2020). Perceptions and knowledge on climate change in local communities in the Offinso Municipality, Ghana. *Information Development*, *36*(1), 16–35. https://doi.org/10.1177/0266666918811391

Steynor, A., & Pasquini, L. (2019). Informing climate services in Africa through climate change risk perceptions. *Climate Services*, *15*(November 2018), 100112. https://doi.org/10.1016/j.cliser.2019.100112

Subedi, D. (2016). Explanatory sequential mixed method design as the third research community of knowledge claim. *American Journal of Educational Research, Vol. 4, 2016, Pages 570-577*, *4*(7), 570–577. https://doi.org/10.12691/education-4-7-10

Sullo, C., King, R. S., Yiridomoh, G. Y., & Doghle, K. (2020). Indigenous knowledge indicators in determining climate variability in rural Ghana. *Rural Society*, *29*(1), 59–74. https://doi.org/10.1080/10371656.2020.1758434

Tadesse, D. (2010). The impact of climate change in Africa. *Institute for Security Studies (Pretoria, Cape Town), ISS Papers*, *220*(November), 20. http://www.issafrica.org/uploads/Paper220.pdf %5Cn

Taherdoost, H. (2016). Sampling methods in research methodology; How to choose a sampling technique for research. *International Journal of Academic Research in Management (IJARM)*, *5*(2), 18–27.

Tan, C. K., Ogawa, A., & Matsumura, T. (2008). *Innovative Climate Change Communication: Team Minus 6 %*. GEIC Working Paper Series 2008-001. Global Environment Information Centre (GEIC), United Nations University.

Tenuche, B. S. (2018). *A mixed-method approach to investigate individual behaviour in online health communities*. PhD Thesis: Brunel University London.

Tracy, S. J., & Hinrichs, M. M. (2017). Big tent criteria for qualitative quality. *The International Encyclopedia of Communication Research Methods*, 1–10. https://doi.org/10.1002/9781118901731.iecrm0016

Trenberth, K. (2018). Climate change caused by human activities is happening and it already has major consequences . *Journal of Energy and Natural Resources Law*, *February*, 1–6. https://doi.org/10.1002/2017EF000709

Trope, Y., Liberman, N., & Wakslak, C. (2007). Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior. *Journal of Consumer Psychology, 17(2), 83-95.*

Tufte, T., & Mefalopulos, P. (2009). *Participatory communication: A practical guide.* World Bank Working Paper 170. Washington DC: The World Bank

UNDP & GEF. (2018). *Climate change adaptation in Africa: UNDP synthesis of experiences and recommendations*. Bangkok: United Nations Development Programme.

UNEP, & UNDP. (2013). National climate change adaptation strategy. *Global Environmental Change*, *5*(1), 1–11.

UNFCCC. (2015). *Adoption of the Paris Agreement. Proposal by the President, Draft decision -/CP.21*. Geneva: United Nations. Retrieved from https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf.

United Nations Institute for Training and Research [UNITAR]. (2013). Resource guide for advanced learning on integrating climate change in education at primary and secondary level. *UN CC: Learn*.

Upadhyay, A. P., & Bijalwan, A. (2015). Climate change adaptation: Services and

role of information communication technology (ICT) in India. *American Journal of Environment Protection*, *4*(1), 70–74. https://doi.org/10.11648/j.ajep.20150401.20

USAID. (2011). *Climate change adaptation in Ghana*. United States Agency International Development.

USAID. (2017). *Climate change risk in Ghana: Country fact sheet.*United States Agency International Development.

USAID, CRC, & NOAA. (2009). *Adapting to coastal climate change a guidebook for development planners.* United States Agency International Development.

Van der Linden, S., Maibach, E., & Leiserowitz, A. (2015). Improving public engagement with climate change: Five "best practice". Insights from psychological science. *Perspective on Psychological Science*. https://doi.org/10.1177/1745691615598516

Van Der Linden, S., Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). Inoculating the public against misinformation about climate change. *Advanced Science News*, 1–7. https://doi.org/10.1002/gch2.201600008

van Ruler, B. (2018). Communication theory: An underrated pillar on which strategic communication rests. *International Journal of Strategic Communication*, *12*(4), 367–381. https://doi.org/10.1080/1553118X.2018.1452240

Vyver, J. V., & Vyver, C. V. (2018). Identifying the nature of participatory communication between stakeholders of a university incubator. *Angewandte Chemie International Edition, 6(11), 951–952.*, *9*(2), 10–27.

Walsh, J., Wuebbles, D., Hayhoe, K., Kossin, J., Kunkel, K., Stephens, G., Thorne, P., \, Vose, R., Wehner, M., Willis, J., Anderson, D., Doney, S., Feely, R., Hennon, P., Kharin, V., Knutson, T., Landerer, F., Lenton, T., Kennedy, J., & Somerville, R. (2014). Chapter 2 our changing climate. In *Climate Change Impacts in the United States: The Third National Climate Assessment* (J. M. Meli, Issue May, pp. 19–67). https://doi.org/10.7930/J0KW5CXT.Recommended

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychological Association*, *66*(4), 315–328. https://doi.org/10.1037/a0023253

Welborn, L. (2018). Africa and climate change: Projecting vulnerability and adaptive capacity. In *Institute for Security Studies*, November, 1-24. https://issafrica.s3.amazonaws.com/site/uploads/ar14.pdf

Wibeck, V. (2014). Enhancing learning, communication and public engagement about climate change-some lessons from recent literature. *Environmental Education Research*, *20*(3), 387–411. https://doi.org/10.1080/13504622.2013.812720

Wolf, J., & Moser, S. C. (2011). Individual understandings, perceptions, and engagement with climate change: Insights from in-depth studies across the world. *WIREs: Climate Change*, *2*(4), 547–569. https://doi.org/10.1002/wcc.120

Wondimagegn, T., & Lemma, S. (2016). Climate change perception and choice of adaptation strategies: Empirical evidence from smallholder farmers.

International Journal of Climate Change Strategies and Management.
https://doi.org/10.1108/IJCCSM-01-2014-0017

Wright, S., Neimand, A., & Steinman, M. (2021). Finding the right messenger for your message. *Standford Social Innovation Review*.

Yarrow, T. (2008). Negotiating difference: Discourses of indigenous knowledge and development in Ghana. *Political and Legal Anthropology Review*, *31*(2), 224–242. https://doi.org/10.1111/j.1555-2934.2008.00023.x

Yoganingrum, A., & Hantoro, W. S. (2019). Selecting the communication channels to deliver climate change information for the coastal and small island community in Indonesia. *PESD*, *13*(2).

Young, T. J. (2016). Questionnaires and surveys. In Zhu Hua, Ed. *Research Methods in Intercultural Communication: A Practical Guide*. In Oxford: Willy (Issue 2015, pp. 165–180).
https://doi.org/10.1002/9781119166283.ch11

Yu, H., Wang, B., Zhang, Y. J., & Wei, Y. M. (2013). *Public perception of climate change in China: Results from the questionnaire survey*. CEEP-BIT Working Paper. http://ceep.bit.edu.cn/english/publications/wp/index.htm

Zakari, S., Ibro, G., Moussa, B., & Abdoulaye, T. (2022). Adaptation strategies to climate change and impacts on household income and food security: Evidence from Sahelian Region of Niger. *Sustainability* 2022, 14, 2847.

APPENDICES

APPENDIX A: SURVEY QUESTIONNAIRE

University of Cape Coast
College of Agriculture and Natural Sciences
School of Biological Sciences
Department of Fisheries and Aquatic Sciences

Topic: Assessing Climate Change Communication Strategies for Effective Adaptation: Perception, Awareness and Challenges among Selected Coastal Communities in Ghana.

Introduction
Thank you for participating in my survey!
My name is Abednego Adjei Baffour. I am working on the above-mentioned topic and I am interested in your views, opinions, and perspectives. The study is part of the academic requirements for the award of a Master of Philosophy degree in Integrated Coastal Zone management. There are no correct or incorrect replies and no consequences if you choose not to participate in the survey. Any data collected for this project will be treated strictly private and would never be linked to your identity. Any results reported would be summarised, with all responses to a subject integrated.
 For further inquiries, please contact me on 0546048770

Duration: 35minutes
Instruction: Please tick [√] appropriately the column that applies to you or is consistent with your opinion and write where necessary.
Section A: Demographic Characteristics
  1. What is your gender?
Male   ☐
Female ☐

  2. What is your age? (in years) ☐
  3. Marital Status
       Single   ☐
       Married   ☐
       Divorced ☐
       Separated ☐
  4. What is your level of education?
       No education   ☐
       Middle school ☐
       Primary   ☐
       Secondary   ☐
       Tertiary   ☐

178

5. Religious Affiliation
    Christian ☐
    Muslims ☐
    Traditional ☐
    Atheist ☐
    Other, specify...

6. Occupation..

7. Community..

8. How many years have stayed in this community? ☐

Section B: Awareness and Perception of Climate Change

9. Are you aware of climate change?
    Yes ☐   [If yes, go to 10)
    No ☐   [If no, go to 11)

10. By what means/channel did you become aware of climate change?
    Media (Radio, TV, Newspapers) ☐
    Social Media (Facebook, etc) ☐
    School ☐
    Family members/Relatives ☐
    NGO's ☐
    Government Officials ☐
    Conversation with people ☐
    Community Information Centre ☐
    Opinion leaders ☐

11. Do you understand climate change?
    Yes ☐   No ☐

12. Do you think that climate change is real?
    Yes ☐
    No ☐
    I am not sure

13. What is the cause(s) of climate change?
    Human activities ☐
    Natural changes in the environment ☐
    Both human activities and natural changes ☐
    Act of God ☐
    Punishment for sins ☐
    Not applicable ☐

14. What consequences of climate change do you experience here (select all that apply)

179

Rising temperature

Erratic rainfall pattern

Sea level rise

Floods and erosion

Heavy winds

Heatwaves

All of the above

15. By ticking the appropriate row, you give your current perception of the following weather parameters.

Weather elements	Community's current perception			
	Increasing	Decreasing	Variable	Constant/No change
Temperature				
Rainfall				

Section   C: Perception   of   Climate   Change   Communication

16. In general, how much attention do you give to news and opinions regarding climate change when you watch, read, or listen to various news channels, programmes, or websites?

No attention at all

A little attention

A moderate amount of attention

A great deal of attention

17. By ticking the appropriate row, you give your general perception of the ongoing climate change communication in your community

Statement	SA	A	N	D	SD
Climate change information is communicated in my local language					
I trust the people who communicate climate change information					
The information is disseminated from multiple channels					
The climate change information is disseminated on time					
I get all the information I need to know about climate change to enable me to adapt properly					
I expect the District Assembly to educate the community regularly on climate change					

180

18. How much have you heard or read about climate change issues in the news over the past few months?

Not at all ☐   A little ☐   A moderate amount ☐   A great deal ☐

19. Has your District Assembly in the last five years educated the community on climate change?

Yes ☐   No ☐

20. How would you rate the general availability and access to climate change information from your District Assembly?

Very good ☐   Good ☐   Satisfactory ☐   Poor ☐   Very Poor ☐

21. Has climate change communication been effective in helping you understand climate change and adapt to its impact?

Yes ☐
No ☐

22. How satisfied are you with the way climate change is communicated?

Very satisfied ☐
Satisfied ☐
Neutral ☐
Dissatisfied ☐
Very dissatisfied ☐

Section D: Challenges Faced in Understanding Climate Change Information

23. What do you think are the barriers/challenges that prevent you from understanding climate change information?

24. In what way(s) does/do the challenge you face impede your adaptation strategies?

....
....

Section F: Ways of Improving Climate Change Communication

25. What do you think are some of the ways climate change communication could be improved?..

....
....

APPENDIX B: FOCUS GROUP DISCUSSIONS GUIDE

Topic: Assessing Climate Change Communication Strategies for Effective Adaptation: Perception, Awareness and Challenges among Selected Coastal Communities in Ghana.

Introduction

I am Abednego Adjei Baffour, a final year Mphil student at the University of Coast. As part of the requirement for the award of the degree, I am investigating the topic "Assessing climate change communication strategies for effective adaptation: Perception, awareness, and challenges among two coastal communities in Ghana." Your input in the discussion will be of utmost to the study due to your location along the coast where climate change consequences are predominantly manifested. The discussion will last for an hour. There are neither correct nor incorrect responses and you are free to express your opinions. As part of this discussion, I, therefore, ask your permission to tape-record our discussions. What you say in the discussions will be transcribed into words without attaching your name and voice. Thank you.

1. Awareness and perception of climate change
    - ❖ Means of awareness
    - ❖ Understanding climate change
    - ❖ Causes of climate change
    - ❖ Impacts of climate change
2. Perceptions of climate change communication
    - Perceptions of the effectiveness of climate communication strategies
    - Perceptions of District Assemblies in climate change communication
3. Challenges faced/barriers to understanding climate change communication
4. Ways by which the challenges affect communities' adaptation strategies
5. Ways of improving future climate change communication

APPENDIX C: INTERVIEW GUIDE

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Introduction

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Awareness and perception of climate change

1. What is climate change?
2. What means do you hear about climate change?
3. What do you think causes climate change?
4. What are the signs/impacts of climate change you are seeing/experiencing in the community in which you are?

   Perception of climate change communication Strategies
5. Perceptions of effectiveness of climate communication strategies

6. Perceptions of District Assemblies in climate change communication

Challenges/barriers to understanding climate change communication
7. What challenges do you face in receiving and understanding climate information?
8. In what way has the challenge/barrier you face in understanding climate change communication affected the way you live?

   Ways of improving climate change communication
9. What do you think are some of the ways climate change communication could be improved?