THE CHALLENGES OF ADOPTING CLIMATE CHANGE ADAPTATION STRATEGIES IN BENIN CITY.

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DATE:

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CERTIFICATION

This is to certify that the research titled **The Challenges of Adopting Climate Change Adaptation Strategies in Benin City** was carried out by **Osamudiamen Osagbemwenorhue Mabel** and presented to the Department of Environmental Management and Toxicology, Faculty of Life Sciences, University of Benin, in partial fulfillment of the requirement for the award of Bachelor of Sciences (B.Sc.) in Environmental Management and Toxicology. It was conducted under stable conditions, was carefully supervised and subsequently approved as having met the requirement for the award of Bachelor of Science degree in Environmental Management and Toxicology.

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DECLARATION

I, **Osamudiamen Osagbemwenorhue Mabel** declare that **The Challenges of Adopting Climate Change Adaptation Strategies in Benin City** is my own work and that all sources that I have quoted have been acknowledged by means of complete references and that this work has not been submitted before any other degree at any other university.

OSAMUDIAMEN OSAGBEMWENORHUE M. **DATE**

DEDICATION

This project is dedicated to God almighty for his unending love and strength. I also dedicate this to my parents and my siblings for their support and assistance. Lastly, I want to dedicate this to my friends for their love and support.

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ABSTRACT

Climate change presents significant threats to human and environmental systems, with impacts including rising temperatures, flooding, drought, biodiversity loss, and declining agricultural productivity. While a variety of adaptation strategies exist, adoption rates remain relatively low, often due to social, institutional, and psychological barriers rather than a lack of available measures. This study helps to investigate the underlying factors that hinder individuals from adopting climate change adaptation strategies, with particular focus on psychological, social, financial, institutional, and sociocultural barriers. A structured questionnaire was administered to 160 respondents in Benin City, and the data were analyzed using SPSS for reliability, descriptive statistics, and correlation analysis. The reliability of the instrument used for this study is 0.867. The result revealed that a majority of respondents are aware of climate change adaptation strategies and understand their potential impacts. Contrary to expectations, insufficient finance and sociocultural beliefs were not identified as significant barriers, as most respondents demonstrated that finance was not a barrier to them and cultural openness to adaptation measures. Institutional and government-related barriers were minimal, though concerns about unclear policies and low trust in government initiatives were noted. Psychological barriers, such as low self-efficacy and skepticism toward expert advice, emerged as moderate obstacles, influencing perceptions of responsibility and individual action. Correlation analysis showed a negative relationship between age and education with climate change awareness, while awareness was positively associated with psychological barriers. Therefore, people in the study area have little challenges in term of awareness, finances, institutional, psychological and sociocultural barriers in adopting climate change adaptation strategies. . However, climate literacy should be integrated into curricula and supported by media and community-based outreach so as to increase awareness.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

The earth and its environment are currently undergoing changes, which may be natural as a consequence of earth processes or artificial as a result of human activities that have altered natural earth processes. Climate change is a result of the alteration of the atmospheric balance which in-turn has diverse effects on the earth's processes and her inhabitants. The Intergovernmental Panel on Climate Change (IPCC) defines Climate change as a change in the condition of the climate that can be identified as changes in the mean and/or variability of its properties over a long period of time, generally decades or more.

Climate is the long-term weather pattern in a region, typically averaged over 30 years (Ahmad *et al*., 2022). Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions but since the 1800's, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas (Seritan, 2023). Climate change can also be referred to as the long-term change in the average weather patterns that have come to define earth's local, regional and global climates. Having defined climate change, it is important to look at the causes of climate change. These causes could either be natural or man-made causes of climate change. The natural causes of climate change contribute less than 30% of the current effects of climate change in the world today (Owusu and Asumadu-Sarkodie, 2016). These natural causes include volcanic eruption, fluctuations in solar radiation, tectonic shifts and changes in our orbit. The factors may be out of human control but there are many contributors of climate change that are

well within the scope and control of humans, the include: Deforestation, gas flaring, burning coal, bush-burning, chemical fertilizers, release of carbon into the atmosphere by automobiles. These human factors which are on the increase everyday contribute greatly to the adverse change in climate. These changes have in turn affected the economy of the world negatively; it has caused scarcity, brought about extinction of lots of species, caused food insecurity and sky-rocketed the cost of food and living in general (Murray, 2017).

Climate change strategies for adaptation are critical for mitigating these impacts. The United Nations Framework Convention on Climate Change defines adaptation as changes made in ecological, social, or economic systems in response to existing or predicted climatic stimuli and their effects or implications. These techniques include planting drought-resistant crop types and practicing regenerative agriculture, enhancing water storage and usage, managing land to reduce wildfire risks, and strengthening defenses against extreme weather events such as floods and heat waves. However, with these strategies individuals fail to adopt these strategies due to some factors or barriers. A barrier is something that could reduce the willingness or capacity of individuals, businesses or other organizations to adapt to the impacts of climate change. The existence of such barriers may mean that the community does not adapt to climate change as effectively as it might otherwise, or could embark on the wrong sort of adaptation. Lack of funds, cultural beliefs, a lack of government assistance, psychological resistance to change, and ignorance about climate threats are few examples of these barriers to adopt these strategies.

As Adger (2009), argue, many seeming limits, especially social ones, are in fact malleable barriers; they can be overcome with sufficient political will, social support, resources, and effort. However, many barriers will make adaptation less efficient or less effective or may require costly changes that lead to missed opportunities or higher costs. In many instances, the barrier

may appear as de facto limits (e.g., a law). Not questioning the changeability of such barriers (however difficult to overcome) may itself be an obstacle to progressing in the adaptation process. Importantly, we take a descriptive rather than a normative approach in which barriers are simply impediments that can stop, delay, or divert the adaptation process. Overcoming all barriers does not necessarily lead to a successful outcome (however de-fined and by whom). Thus, a hypothetical smooth, barrier-free process is not a sufficient condition to guarantee adaptation success. In turn, not even the best-run process should be expected to be free of barriers, and its outcomes may still require adjustments in the next iteration. However, ignoring certain best practices throughout the process (such as effective stakeholder involvement, consensus or broad agreement if and when it is required, adequate information, considering both biophysical and social dimensions of the problem, or adequate funding) could lead to maladaptation.

In terms of the nature of the barriers reviewed, many authors classify them in categories, especially "institutional" and "socio-economic" factors, even though "environmental" and "composite vulnerability" factors are also discussed, for instance through the biophysical and technological limits of the systems involved (Adger *et al.*, 2007; Reckien *et al.*, 2015). Depending on the geographical area, some specific constraints to local contexts may be significant, such as isolation and limited natural resources for islands (Mimura *et al.*, 2007). Many limits have been defined theoretically, for example as determinants of adaptive capacity acting as barriers when not sufficiently available: economic resources, technology, information and skills, infrastructure or institutions and equity (Smit and Pilifosova, 2001). When associated with a lack of economic resources, obstacles can be associated with difficulty in estimating

quantifiable costs related to gains, underfunding or a cost-benefit ratio which is not always in favour of public action (Wilbanks and Sathaye, 2007).

1.2 STATEMENT OF PROBLEM

Even though the hazards of climate change are increasing such as rising temperatures, unpredictable rainfall, droughts, flooding, and lower agricultural output many individuals continue to fail to adopt the available adaptation strategies. Locally and globally, a number of adaptation options have been promoted, but the rate of adoption remains relatively low. The inability to adopt is frequently caused by barriers rather than a lack of accessible strategies. Lack of funds, cultural beliefs, a lack of government assistance, psychological resistance to change, and ignorance about climate threats are a few of them. The ability of individuals to adjust may also be impacted by socioeconomic factors including education, income, and gender. When Indiviuals do not adapt to these strategies there might be effects like rise in temperature, rising sea level, biodiversity loss, damage to infrastructures, agricultural losses, increase disaster, food and water insecurity, resources conflicts, heat-related illness, death and climate migration.

The persistent gap between awareness and action raises critical questions: Why do people even when aware of climate threats, fail to adopt adaptive behaviors? What factors are most influential in shaping individual decisions about climate adaptation? Without addressing these core issues, efforts to build climate resilience at the community and national levels may remain ineffective. Therefore, this study seeks to uncover and analyze the underlying factors contributing to the failure of individuals to adopt climate change adaptation strategies, with the aim giving practical solutions.

1.3 AIM AND OBJECTIVES

AIM

This study helps to investigate the underlying factors that hinder individuals from adopting climate change adaptation strategies.

OBJECTIVES:

1. To evaluate how socio-demographic characteristics (such as age, education, income, and occupation) affect people's capacity and willingness to adapt.
2. To assess people's level of awareness of the risks associated with climate change.
3. To determine the major financial, institutional, psychological and sociocultural obstacles preventing people from implementing climate change adaptation measures.
4. To evaluate the impact of government laws and non-governmental organizations (NGOs) on community-level adaptation.

1.4 SIGNIFICANCE OF STUDY

This study evaluates the factors why individuals fail to adopt climate adaptation strategies. Understanding why people do not use climate change adaptation strategies is essential to enhancing climate resilience, especially in regions that are already at risk. This finding is significant because it highlights the often overlooked behavioral and human dimensions of climate adaptation. The inadequate implementation of such policies, even after their creation and promotion, leads to heightened vulnerability to climate-related risks such as drought, flooding, and food poverty. By identifying the root causes such as institutional gaps, cultural resistance, financial limitations, or a lack of awareness this study provides crucial insights for

governments, non-governmental organizations, and development agencies looking to design more effective, inclusive, and targeted adaptation programs. This findings will help contribute to bridging the gap between practice and policy, helping to ensure that climate change adaptation efforts are people centered and specific. Additionally, the study will serve as a reference for future academic work in the face of climate change.

CHAPTER TWO

LITERATURE REVIEW

2.1 CONCEPT OF CLIMATE CHANGE ADAPTATION

Adaptation is a component of both national and international responses to climate change. Unlike mitigation, which requires lowering sources of pollution, adaptation is a developmental issue rather than an environmental one (Zeirvogel, 2014). Adaptation to climate change involves various transboundary and global repercussions that are severe and intense (Adger, 2009). Critical parts of adaptation include vulnerability reduction, resilience building, and disaster risk response and management. It also comprises acts intended at reducing damages, recovering from damage, and acting when recovery is slow or impossible. Adapting to climate change includes modifying physical, environmental, and socioeconomic factors in order to minimize harm while maximizing advantages. This includes categorizing geographical locations based on their adaptability or resilience (Ruhl, 2010), as well as recognizing and mitigating climate change sensitivities through socioeconomic improvement (Kaswan, 2013). While the ability to adapt or improve socioeconomic situations does not ensure preparedness to deal with the effects of climate change, these characteristics lessen social vulnerability to climate change.

The IPCC 2001 defined adaptation as "adjustments in natural or human systems to a new or changing environment … in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". The Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC AR5, 2014) defines adaptation as the process of making adjustments to an actual or predicted climate and its effects. Specifically, in human systems, adaptation aims to mitigate harm or exploit advantageous opportunities. In terms of

natural systems, human adaptation aims to facilitate some modifications to the climate and its impacts. According to the IPCC, adaptation to climate change occurs in a variety of ways and can be classified based on factors such as timing, scope, purposefulness, and adapting agent. Depending on these criteria, adaptation may be anticipatory/proactive or reactive, local or regional, short- or long-term, autonomous or planned, and individual or collective/government action. The IPCC's AR5 report emphasizes that planned adaptation in human systems can be modest or transformative. Incremental adaptation is the preservation of the integrity of human systems such as institutional, economic, technological, and social systems so that they can survive the effects of climate change (IPCC AR5, 2014).

Transformational adaptation, on the other hand, aims to modify basic features of human systems in response to climate change (IPCC AR5 2014). Such changes could be related to migration, lifestyle, or the abandonment of traditional ways of doing things in favor of more adaptable approaches. While incremental adaptation involves gradually incorporating climate change adaptation considerations into governance, transformational adaptation is more drastic and necessitates fundamental changes to the governance system (Bulkeley and Tuts, 2013). Coastal decision-makers face challenges and limitations in their efforts to adapt to climate change and sea-level rise. A barrier is any form of problem or constraint that can hinder or halt progress toward adaptation but can be overcome with focused effort. A limit is anything that cannot be exceeded without incurring unjustifiable action or expense. There are numerous potential barriers to adaptation, ranging from people's lack of belief in climate change as a major problem that must be handled, to a lack of financial resources and leadership. People with a poor personal understanding of climate change may struggle to plan for its consequences, let alone accept that others should plan to adapt. This could be because they believe that too little is known about

climate science, that the science isn't 'settled', that greater assurance about the research is required before measures can be taken, or that the risks are low and action should be delayed. However, having more knowledge about science does not always result in action; if people's values, emotions, logic, or culture are challenged, additional knowledge is unlikely to make a difference.

2.2 THEORETICAL MODELS RELEVANT TO INDIVIDUAL BEHAVIOR

Understanding human behavior necessitates a multifaceted approach, as it is influenced by numerous and interconnected factors. To traverse these complexities, psychologists have evolved a variety of theoretical frameworks, each offering unique viewpoints on why we behave the way we do. These ideas help us explain many elements of human behavior, from the automatic responses conditioned by our surrounds to the deliberate decisions guided by cognitive processes and personal growth goals. Here, we look at three fundamental theoretical frameworks in psychology: behaviorism, which investigates the role of environmental stimuli in shaping observable behaviors; cognitive psychology, which focuses on internal mental processes and how they influence actions; and the humanistic perspective, which emphasizes personal growth and self-actualization as key drivers of behavior. Each theory offers unique insights and has specific applications, ranging from educational settings to therapeutic approaches. Exploring these theories allows us to develop a better understanding of the various forces that influence behavior, as well as appreciating the various methods available for changing behavior and improving human well-being. This introductory exploration lays the groundwork for a detailed look at each theoretical position in the parts that follow:

1. Behaviorism

Behaviorism is a theoretical framework that emphasizes the role of external factors in influencing observable behavior. This viewpoint holds that all behaviors are taught via interaction with the environment and can be understood without considering internal ideas or feelings.

Foundational Principles

Behaviorism emphasizes visible and quantitative aspects of human behavior. This viewpoint holds that behavior can be investigated in a systematic and observable manner, regardless of interior mental processes. This method dates back to the early twentieth century, with substantial contributions from John B. Watson, who is widely regarded as the founder of behaviorism. Watson's claim that psychology should focus on apparent behavior rather than internal psychology paved the way for additional research in this discipline.

Key Contributions and Theorists

B.F. Skinner expanded behaviorism with his work on operant conditioning, a method of learning that uses incentives and punishments to motivate behavior. Skinner established that behavior can be controlled and modified by controlling the consequences. His research, most famously the Skinner Box, demonstrated how positive reinforcement may increase behavior by instilling a good consequence after the desired behavior.

Applications of Behaviorism

Behaviorism concepts have been widely implemented in a variety of sectors, including education, psychology, and animal training. Behavioral tactics are employed in educational settings to encourage desirable behaviors while discouraging negative ones. New skills and

habits are taught using techniques like repetition and reinforcement schedules. Furthermore, behaviorism has significantly influenced the development of therapies for various behavioral issues, including phobias, compulsions, and addictions, where techniques such as systematic desensitization use behaviorist principles to replace undesirable behaviors with more desirable responses.

Critiques and Limitations

While behaviorism has had an impact, it has also received criticism, particularly for dismissing cognitive processes as relevant to understanding behavior. Critics claim that behaviorism ignores the importance of internal thoughts and emotions in interpreting complicated acts. The emergence of cognitive psychology in the mid-twentieth century provided a counterweight to rigorous behaviorist approaches by adding mental processes into psychological research. To summarize, behaviorism has been critical to the scientific progress of psychology. Its focus on observable and measurable behaviors has enabled systematic research and practical applications that have had a significant impact on education, treatment, and our overall understanding of human and animal behavior. Despite its flaws, behaviorism's contributions continue to impact current psychological methods.

2. Cognitive Psychology

Cognitive psychology is a discipline of psychology that investigates the complexities of mental processes such as reasoning, memory, perception, and problem solving. This theoretical framework highlights the relevance of internal mental processes in comprehending how people receive, analyze, and store information, which directly determines their behavior.

Foundational Principles

Cognitive psychology assumes that mental processes may be scientifically studied. This method is frequently compared to considering the mind as an information processor, similar to how a computer inputs, processes, and produces data. This viewpoint represents a substantial departure from behaviorist approaches, which primarily disregard the mental processes behind behavior.

Key Contributions and Theorists

Ulric Neisser, known as the "father of cognitive psychology," was a pioneering figure in the field. Neisser's work established a comprehensive explanation of how cognitive processes interact in everyday circumstances, substantially affecting our experiences and behaviors. Jean Piaget, another important contributor, created the theory of cognitive development, which explains how children grow intellectual maturity and knowledge through distinct stages of cognitive development, each distinguished by unique ways of thinking and perceiving the world.

Applications of Cognitive Psychology

Cognitive psychology has numerous applications, including education, where insights into memory and learning processes have aided in the development of more effective teaching techniques. It is also important in the field of psychotherapy, particularly cognitive behavioral therapy (CBT), which helps patients notice and reframe faulty beliefs in order to change their behavior. Furthermore, cognitive psychology concepts play an important role in user interface design, as knowing how humans process information may help create more intuitive and user-friendly technology.

Cognitive Neuroscience

The rise of cognitive neuroscience has helped to bridge the gap between cognitive psychology and biological sciences. Using techniques such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), researchers may see the brain in action and determine which areas are involved in specific mental processes. This integration has helped to clarify our understanding of the link between brain activity and cognitive processes, giving us a more complete picture of how ideas and perceptions drive behavior.
As a result, cognitive psychology provides critical insights into the complexities of human cognition and how it influences behavior. Understanding how individuals see, think, and remember allows us to apply this information to a variety of sectors, including education and mental health, thereby improving both learning and therapeutic procedures.

3. Humanistic Perspective

The humanistic approach to psychology stresses individual potential, personal progress, and the concept of self-actualization. This approach sees humans as essentially decent and capable of self-directed improvement, providing a more hopeful alternative to theories that focus on dysfunction or merely behavioral aspects of psychology.

Foundational Principles

The foundation of humanistic psychology is the concept that people have a natural desire to improve themselves and reach their greatest potential. It contends that psychological disorders occur when normal progress is stifled by an unsupportive environment or self-imposed

limitations. This approach is based on the concept of self-actualization, which is the process by which people discover their own abilities and become their authentic selves.

Key Contributions and Theorists

Abraham Maslow and Carl Rogers were two of the most important figures in the creation of humanistic psychology. Maslow is most recognized for his hierarchy of needs model, which depicts the stages of human development. At the apex of this hierarchy is self-actualization, which is the realization of one's potential and symbolizes the pinnacle of psychological development. Carl Rogers pioneered person-centered therapy, which stresses the therapist's role in creating a supportive atmosphere in which the client can drive their own improvement. Rogers felt that in order to reach self-actualization, a person needed to be in an atmosphere that was real, accepting, and empathetic.

Applications of Humanistic Psychology

The humanistic approach is widely applicable, particularly in therapy, education, and organizational development. In therapeutic contexts, it promotes self-reflection and self-awareness as tools for change. This approach has influenced tactics that emphasize personal responsibility and self-healing, and it is especially prevalent in counseling procedures that help clients gain personal insights and boost self-esteem. Humanistic concepts in education have inspired the development of teaching techniques that promote student-centered learning. Teachers who take this approach prioritize the whole student, aiming to cultivate their innate drives and potential rather than simply conveying knowledge.

Criticisms and Contemporary Relevance

While the humanistic perspective has been attacked for its lack of factual rigor and subjective ideas, it is nevertheless an important element of psychological discourse. It criticizes reductionist ideas of mechanical processes in behavior and cognition, pushing for a more holistic view of the individual. Mindfulness and positive psychology are current psychology concepts that strongly rely on humanistic notions, stressing well-being and positive elements of human experience. As a result, the humanistic approach provides a surprisingly optimistic picture of human nature and behavior, emphasizing progress, self-actualization, and psychological well-being. By emphasizing personal experience and individual potential, it gives a complete framework for understanding human motivation and behavior, and it continues to impact modern psychological methods and ideas.

2.3 EFFECTS OF CLIMATE CHANGE

The physical environment of Earth and all living things on the planet experience a series of negative consequences due to climate change. Human, animal, and plant life are all impacted by changes in the physical environment of Earth. Particularly at risk from climate change are coastal human groups, forests, and coral reefs. The increased vulnerability to chemical pollution could be one of the consequences of climate change (Merila and Hendry, 2014). While the majority of climate change's effects are probably going to be negative, some areas might see some health benefits. For instance, fewer deaths and health problems linked to temperature may occur during warmer winters.

PHYSICAL PLANET EARTH'S ENVIRONMENT

The core accretion theory states that Earth formed via accretion from the solar nebula around 4.54 billion years ago, or roughly one-third the age of the universe (Co'Neill, 1991). Over the course of its lengthy history, Earth has seen climatic change. The physical environment of the planet Earth is negatively impacted by the current climate change in a number of ways. It has an impact on the frequency and intensity of natural disasters and extreme occurrences (De, 2018).

1. **Temperature**: Earth has experienced long, cold (glacial) and warm (interglacial) ice ages on 100,000-year cycles for at least the last few million years. Increased temperatures on Earth's land surfaces and upper ocean layers are linked to the current climate change (McMicheal and Lindgren, 2011). Surfaces on land are warming more quickly than those on the water. More water vapor may be stored in a warmer environment, increasing the average amount of precipitation. The Earth's temperature has risen by about 0.7°C in the last 70 years. There have been more warm days and nights and fewer cold ones since 1950. The rate of warming has been higher since 1976 than it has been in the previous millennium. There are extreme temperatures during any given time. The lowest recorded temperature on Earth in the last 20 years was −94.7°C in Antarctica in 2010, while the highest recorded temperature was 70.7°C in Iran's Lut Desert in 2005. The average world temperature right now is about 15.0°C. According to Sobrino *et al*. (2020), surface temperatures are now increasing by roughly 0.2°C per ten years. The Intergovernmental Panel on Climate Change (IPCC) predicts that global mean temperatures would rise by 0.9 to 5.4°C by 2100, depending on various emissions scenarios.
2. **Mountain glaciers and lakes**: The rate of ice loss in Greenland and Antarctica is accelerated by climate change, which also causes mountain glaciers to melt. Certain glaciers, such as those in the Peruvian Andes, the Nepalese Himalayas, and the Chinese

Meili Snow Mountains, have significant religious and symbolic significance for the local population (Allison, 2015). Globally, lakes are freezing less frequently and for shorter periods of time. Thousands of lakes may lose their winter ice cover in a few decades.

3. **Sea levels**: Sea levels rise as a result of climate change. Sea levels rise as a result of either an increase in the mass of the water in the ocean mostly from melting glaciers or an increase in the volume of the water already in the ocean due to warming and expansion. The mean sea level has risen by about 0.20 meters since 1900. The global mean sea level has increased by 0.003 meters annually on average during the past 25 years. Sea levels are expected to rise by 0.40 to 1.50 meters by 2100, depending on various emissions scenarios (Hsiang and Kopp, 2018).
4. **Wildfires:** Wildfires are occurring more frequently due to climate change. In a number of nations, including Brazil, the United States, and Australia, the severity and destructiveness of forest fires have increased due to the dry, hot weather (Brando *et al*, 2020). Deforestation, significant property destruction, protracted exposure of large people to poisonous and polluted air with potential health effects (such as respiratory disorders), and even death are all possible outcomes of wildfires. Recent droughts have made the Amazon (Brazil) more combustible and susceptible to wildfires (Brando *et al*, 2020). Recent years have seen severe fall wildfires in California (USA) (Goss *et al*., 2020); the deadliest and most damaging flames in 2017 and 2018 were directly responsible for over 100 fatalities.
5. **Droughts**: Drought is a multifaceted, complex phenomenon that is impacted by a variety of biological and physical forces. One of the most costly natural catastrophes is drought. More frequent and severe droughts, particularly in subtropical areas, are a result of

climate change, which encourages the spread of deserts (Hsiang and Kopp, 2018). Hunger, malnutrition, suffering, and demographic shifts will result from this.

PLANTS

Climate change affects the phenology of plants. The level of atmospheric carbon dioxide, temperature, sea level, rainfall, weeds, pests, and microbes are among the various aspects of climate change that are involved (Wiens, 2016).

1. **Survival**: Climate change has an impact on plant survival (Raza *et al*, 2019). Increased land surface temperatures and the mild winters that follow encourage the growth of pests (such as pine beetles), the invasion of farmlands by salty water, wildfires, and droughts endanger plant life and cause damage to human agriculture and forests. Some reports claim that the most vulnerable industry negatively impacted by climate change is agriculture. Food insecurity will result from the decline in farming activity.
2. **Blooming, pollination, and fructification**: Climate change has an impact on plant development, blooming, pollination, and fructification (Rai *et al*. 2015). Plants bloom earlier, for a shorter length of time, and die younger as winters shorten and springs warm. A winter chill is necessary for numerous fruit-producing trees. Climate change-induced insufficient chilling can have an impact on fruit tree productivity (e.g., fewer and smaller fruits, as well as changes in color, texture, and taste) (Rai *et al*, 2015). Pollinators, particularly bees, face increasing risks to survival. Fruit yield is declining while costs are rising due to a loss of synchronization between plants and pollinators caused by seasonal shifts and a drop in pollinator numbers.

ANIMALS

Climate change exposes animals to a number of stressors, which affect metabolic and endocrine functioning and may have consequences for species survival (Jenssen, 2006). With climate change, more animal species are becoming extinct each year. About 700 mammals and birds are affected. The degree of sensitivity varies according on the type of animal, and various species will be affected differently. Species having a low tolerance for rising temperatures are prone to extinction. Polar bears, koalas, elephants, sea turtles, cheetahs, pandas, and penguins are among the creatures that are vulnerable or endangered. Climate change will force species to either relocate to more favorable sites (e.g., higher elevations and latitudes) or adapt to changes in their current habitats (e.g., feeding and breeding patterns).

1. **Habitat**: Climate change can lead to habitat degradation or loss for a variety of species (including polar bears, koalas, and birds). Polar bears are dependent on sea ice. The rising temperature is forcing arctic sea ice to melt, threatening polar bear habitat. Koalas are reliant on eucalyptus trees. Increased temperatures and drought are triggering wildfires, harming koala habitat (Natayan & Williams, 2016). Lake Urmia (Iran) was formerly a major tourist site and is now a bird habitat. The lake is drying up, primarily due to climate change.
2. **Migration, breeding, and gender determination:** Warmer springs have accelerated migration and nesting in most bird species in recent decades (Charmantler and Glenapp, 2014). Rising sea levels pose a threat to sea turtle eggs, as most turtles lay their eggs on beaches. Climate change has been shown to alter sex determination in a variety of animals (DeCourten and Brander, 2017). The sex of sea turtles is decided by their nest temperatures. Cool temperatures create more males, whereas warm temperatures produce

more females. Climate warming modifies the gender distribution of sea turtles (females outnumber males). Certain areas may end up producing only female turtles, potentially leading to the extinction of local species due to a lack of mating partners.

HUMANS

Climate change poses a significant hazard to human life. It has various negative health implications, including increased morbidity and death (Wu *et al*., 2016).

1. **Temperature**: The human core temperature averages 37.0°C and is strictly managed between 33.2°C to 38.2°C to ensure proper physiological function. Extreme departures from the usual core temperature, such as a drop below 27.0°C (hypothermia) or a rise above 42.0°C (hyperthermia), can be fatal. Climate change is increasing exposure to extreme heat in many places of the world. Increased temperature causes physiological reactions in humans, putting some organs at risk and exposing people to higher morbidity and mortality.
2. **Nutrition**: Climate change causes water and food insecurity/shortages, which have a substantial influence on cleanliness, nutrition, and food safety in many nations. In the absence of proper drinking water desalination as a result of increased salinity caused by sea-level rise (particularly in low-income countries such as Bangladesh), high salt exposure through drinking water, food, and bathing can lead to a variety of health problems (for example, hypertension and skin diseases). Climate change has a negative impact on many regions' food production systems (Gross *et al*, 2020). According to the International Rice Research Institute in the Philippines, a 1.0°C increase in nighttime temperatures can cut rice yields by 10%. With rising ocean temperatures, various fish

populations may migrate to higher latitudes, affecting millions of people's dietary protein supplies.

3. **Infection**: Climate change influences the spread of some infectious diseases because variations in temperature, precipitation/humidity, wind, and solar radiation can affect the survival, reproduction, and distribution of disease pathogens, vectors/hosts, and their transmission environment. Several infectious disorders are involved, including malaria, dengue fever, and Lyme disease (Liang and Gong, 2017).
4. **Population movement**: Climate change, which creates unsuitable living conditions (e.g., desertification, sea-level rise, loss in freshwater availability, food shortages, health difficulties), would cause many people to relocate. Human migration has an especially strong impact on poor communities. It is anticipated that by 2050, up to several hundred million people will have moved (McMichael, 2012). Countries will face a variety of issues as a result of population movements.
5. **Vulnerable populations**: Climate change disproportionately affects children, the elderly, indigenous communities, low-income individuals, outdoor laborers, isolated populations, and people with pre-existing diseases. Climate change's health implications disproportionately affect low-income and geographically vulnerable countries (for example, Bangladesh). However, in higher-income countries (for example, the United States), specific ethnic and socioeconomic groups are particularly vulnerable, as evidenced by the Chicago heat wave of 1995 and the New Orleans storm Katrina of 2005. According to the World Health Organization, climate change caused around 141,000 deaths worldwide in 2004, with children accounting for 85% of the total. The deaths caused by the 2003 European heat wave were primarily among the elderly.

2.4 CLIMATE CHANGE ADAPTATION STRATEGIES

An adaptation strategy to climate change is defined as any activity that increases people's resistance to climate change. A climate change adaptation strategy entails anticipating the negative implications of climate change and taking the required precautions to minimize or lessen their impacts. This indicates that adapting to climate change includes anticipating and responding to new situations, i.e., determining what changes are on the way and what adaptations are required. It is a framework for managing both current and future climate threats (IPCC, 2007). It also considers the prospect of reducing current and future economic, environmental, and social climate-related costs. A climate adaptation strategy entails predicting the changes brought on by climate change and then taking necessary action to avoid or lessen the resulting damage or take advantage of potential opportunities. A climate adaptation strategy comprises forecasting the effects of climate change and then taking the required steps to avoid or mitigate the damage or capitalize on any possibilities. Climate change adaptation techniques can be structural or behavioural, depending on whether they affect an organism's physical or behavioral aspects. Climate change adaptation strategies include either mitigation efforts to reduce the massive amount of greenhouse gases in the atmosphere, or adaptation efforts to prepare systems and civilizations to withstand the effects of climate change (Alam and Mushtaq, 2017). Governance, infrastructure, money, and institutions are all critical components of global climate change adaptation. Global climate change solutions encompass a wide range of responses, such as financial adaptations, technological strategies, land-based strategies, labor adaptations, and cultural strategies. They incorporate local knowledge and talent. Growing superior agricultural varieties, adjusting planting dates, fishing at night, and employing bulk energy are all examples of local climate

change adaptation strategies (Spence and Pidgeon, 2010). Climate change adaptation options on a global or local scale have emerged in part because it has become evident that cutting carbon emissions has not been effective (Khan and Roberts, 2013). Adaptation can be identified across three aspects: - The subject of adaptation, that is, who or what adapts, is observed in changes in ecological, social, and/or economic systems. These changes can be the result of natural responses, which typically involve organisms or species, or socio-economic or institutional responses, which are carried out by an individual or a group of private or public actors. The aim of adaptation (what they adapt to): changes in average circumstances or the variability of extreme occurrences may elicit adaptive responses in the face of climate change. In the first situation, changes occur gradually and are often within the system's capacity. In the second case, changes occur quickly and fall outside of this range (Narz *et al.*, 2019); How they alter (or adapt): This includes what resources people employ, when and how, and the outcomes. Adapting to climate change requires taking appropriate efforts to prevent the negative effects of climate change or capitalize on the positive ones by adopting the necessary modifications and changes. Adaptation has three potential goals: minimizing exposure to the risk of harm, developing the ability to deal with unavoidable damage, and capitalizing on new opportunities. Adapting to climate change entails improving our ability to withstand or avoid negative consequences, as well as capitalize on more favorable situations, hence reducing risk and susceptibility.

2.5 BARRIERS TO CLIMATE CHANGE ADAPTATION

1. PSYCHOLOGICAL BARRIERS

Psychological barriers are internal, meaning that an individual's knowledge, ideas, and attitudes influence their actions. Psychological barriers in adaptation methods are psychological, cognitive, or emotional roadblocks that prevent individuals or groups from adopting new behaviors or routines to deal with environmental changes. These hurdles may include poor knowledge, doubt, denial, optimism bias, or resistance to change owing to existing routines or habits.

I. Limited Cognition: According to Simon (1957) and Tversky and Kahneman (1974), humans are less logical than previously supposed. This is as true for thinking about climate change as it is for other topics. The following are some examples of how individual thought is not totally rational, posing a barrier to mitigation and adaptation;

Ignorance: For some people, ignorance can be a barrier to action in two ways: not understanding that there is a problem and not knowing what to do once it is identified. Most polls (e.g., Pew Research Center, 2006) show that a portion of respondents answer "don't know" when asked about climate change. Even today, some individuals throughout the world are completely uninformed that climate change is an issue. Obviously, this segment of the world population is unlikely to take deliberate action to mitigate climate change. The second component of ignorance, found among the far larger proportion of the worldwide population that is aware of the problem, is defined by a lack of information about the source and scope of climate change (e.g., Bord, O'Connor, & Fisher, 2000). This deficiency results in ignorance about (a) the precise activities to do, (b) how to carry out actions of which one is aware, and (c) the relative beneficial

effects of various actions. Given that most people are not technical experts, they do not have or understand the relative scale of the positive effects of diverse activities.

Uncertainty: Experimental studies on resource challenges show that perceived or real uncertainty affects the frequency of pro-environmental behavior (e.g., de Kwaadsteniet, 2007; Hine & Gifford, 1996). Individuals tend to view any hint of uncertainty, such as the size of a resource pool or the rate at which the resource regenerates, as sufficient cause to harvest at a rate that benefits self-interest over environmental interests. Uncertainty about climate change is also likely to be used to justify inaction or postponement of climate-related action.

Perceived behavioral control and self-efficacy: Because climate change is a global issue, many people believe they can do little about it as individuals. This is the well-known collective action problem (Olson 1965). In psychological terms, people sometimes do not act because they believe they have little behavioral control over the outcome (e.g., Ajzen, 1991; Huebner & Lipsey, 1981) or that their actions will have little impact (lack of self-efficacy; Ajzen, 2002). Perceived behavioral control can be a powerful predictor of whether a person chooses to use public transit rather than a private car (Heath & Gifford, 2002; Kaiser & Gutscher, 2003).

II. Comparisons with other people: Humans are highly sociable animals, and comparing one's condition to that of others is a deeply entrenched habit. This comparison can take a variety of forms;

Social comparison: People constantly compare their activities to those of others (Festinger, 1954), and they generate subjective and descriptive norms from their views of what is the "proper" course of action. This tendency is recognized in the theory of planned behavior (Ajzen,

1991) and the value belief-norm model (Stern, 2000), among other theories, and has been applied to a wide range of pro-environmental activities and interventions.

Social norms and networks: While norms can drive progress in environmental challenges (Thøgersen, 2008), they can also lead to regress. A study of home electricity utilization demonstrated norms' double-edged power. When householders were told how much energy the typical member of their neighborhood used, they tended to adjust their energy use to meet the norm (Schultz *et al.*, 2007), either decreasing or raising their energy consumption correspondingly. Fortunately, the researchers discovered that the rises could be avoided by offering low-energy users positive feedback for consuming less energy. Norms can also be developed through social networks in neighborhoods or workplaces. Again, they can be detrimental in the sense that anticlimactic behavior patterns can predominate, but proclimatic tendencies can also. Rogers (1983) described an example in which mapping of who spoke to whom and mapping of dwelling proximity combined to explain why 7 of 44 residents (16%) installed photovoltaic panels on their homes (far exceeding the national average of 1%). Social networks can be effective mitigating influences.

Perceived inequity: Perceived inequity is frequently used as a justification for inaction: "Why should I change if they won't change?" Typically, well-known figures, other economic sectors, or other countries are cited as not participating, providing justification for no action. The fear of being victimized by free-riders (Kerr, 1983; Olson, 1965) is a barrier for some people, who wonder why they should contribute responsibly to the climate change cause when (they believe) others will not. In experimental resource dilemmas, when there is any kind of injustice or imbalance (actual or imagined), cooperation tends to drop.

2. SOCIAL BARRIERS

Social barriers to adaptation are concerned with the social and cultural processes that influence how people respond to climate variability and change, whether in the form of extended drought, heavier and more unpredictable rainfall, or rising temperatures. The IPCC states that, to date, ‘social and cultural restrictions to adaptation are not thoroughly investigated', admitting the climate change literature's little focus to addressing social limitations thus far (IPCC, 2007). Social barriers are made up of a variety of cognitive and normative constraints that impede individuals or groups from seeking the best forms of adaptation. A critical issue is the organisation and structure of social institutions. In this context, institutions are thought to embody the 'laws of behaviour' that control belief systems, norms and behaviour, and organizational structure. Social institutions come in many forms, including local farmer collectives, indigenous knowledge institutions, and collective ownership rights to forest resources. When confronted with the dangers posed by climatic variability and change, such institutions have a significant influence on individual behavior and appropriate adaptation actions. The social sciences have long recognized that deeply established cultural and societal norms and laws impact an individual's actions and behaviours (Ostrom 2005). According to natural resource management literature, 'barriers to community or individual action may not reside largely in a lack of information or understanding alone, but in social, cultural, and institutional issues'. It is therefore vital to remember that reasonable behavior in response to climate stress and shock may not always lead to the creation of adaptation measures.

Examples;

I. Belief that uncertainty is too great to warrant taking adaptation action now

II. Lack of acceptance of risks associated with implementing adaptation action

III. Change not yet seen as a problem: temptation to wait for the impact then react

IV. Cultural norms that discourage change and innovation: an unwillingness to adopt new practices.

V. Traditional means of reacting to climate stress and shock may no longer be appropriate given that there is no cultural memory when it comes to future climate change

VI. Restrictive traditional and religious norms (i.e. reliance on traditional means of weather forecasting and planting, restricted role of women in the household/community, dependence on traditional means of coping with climate hazard).

VII. Social/cultural rigidity: lack of institutional flexibility.

3. INSTITUTIONAL BARRIER

Adger *et al*. (2009) establish factors that reflect societal constraints to adaptation, which might be relevant in analyzing the causes of institutional process barriers. It is believed that adaptation restrictions extend beyond biological, technological, and economic barriers. Limits are considered to evolve from inside society and are determined by ethics, knowledge, risk attitudes, and culture. Limits to adaptation are viewed as a social construction that varies based on how and what we value (ethics), how and what we know (knowledge), how and what we experience (risk), and how and why we live (culture).This has a variety of implications when it comes to institutional adaptation processes. The total of a society's values is turned into action through the development of institutions and norms that constitute governance systems to respond to risk, social change, and resource distribution. The compromise between a variety of values inside institutions, as collective reaction mechanisms, has an impact on any specific adaptation aims.

According to Agrawal (2008), institutions have a significant influence in establishing the agenda based on their perceptions of climate change. Experience from past or present events influences both responses and future expectations. This creates a need to select specific adaptation tactics or make specific adaptation judgments, and it can influence the amount of work and resources put into adaptation measures. Another socially created limit to adaptation proposed by Adger (2009) is defined by social traits exhibited in various types of organizations.

For example, institutions that are not founded upon pro-environmental or eco-centric organisation are not complicit to long term sustainability. Furthermore, technology and learning capacity shape to some degree the ability to adapt but more significantly are 'the ethics of the treatment of vulnerable people and places within societal decision-making structures' (Adger *et al*. 2009). Such social variability means that social barriers are specific to the context in which adaptation is discussed and negotiated. Biesbroek *et al*. (2013) argue that 'barriers are context specific across sectorial, spatial, and temporal scales' where each case presents 'a unique configuration of factors and conditions that pose barriers to adaptation in their specific context, making generalization a challenge'. Therefore, it can be seen that the social fabric shaped by norms, values, perspectives and ethics play a key part in the discourse of different institutions.

Nevertheless, barriers are unlikely to be specifically unique in relation to adaptation processes and similar barriers relating to institutions are likely to occur within other non-climate specific policy arenas. Biesbroek *et al*. (2013) identify only three adaptation-specific barriers in the current literature: 'The long-term impacts of climate change versus the short-term dynamics of politics and decision-making; the reliance on scientific models to identify, understand, and communicate the problem and propose solutions; and the inherent uncertainties and ambiguities of climate change'. Therefore, it is also important to note that climate change is also just one

driver of change amongst a variety of non-climate related social and ecological problems and pressures that institutions have to respond to for successful adaptation. For example, industrialization is a driver of change that affects livelihoods and has adverse environmental impacts which may affect the farmer communities' means to adaptation in different ways. On the one hand, it may accentuate the adaptation process through providing livelihood diversification but may also decrease the ability of rural people to adapt because of polluting natural resources.

4. FINANCE AS A BARRIER

When faced with the severe repercussions of climate change, those living in poverty frequently have fewer means to cope and recover. Among other problems, people have limited ability to migrate to safer places, construct physically sturdier homes, or pay for the costs of adaptation and coping strategies. These challenges are influenced by variances in local infrastructure and resources. persons living in poverty in a disadvantaged region, for example, are more likely to have limited access to recovery choices and public resources than persons in affluent places or nations. Adapting livelihoods to climate dangers and changing climatic circumstances, for example, by using technological solutions or transitioning to new forms of employment, is a significant problem. Lower-income farmers in Uganda have found it more difficult than wealthier farmers to adapt their crop patterns and acquire water-saving equipment and storage sources during periods of low rainfall (Hill and Mejia-Mantilla, 2015). Farmers living in poverty in West Africa's Sahel region are less able to expand their land resources, intensify farming to maintain food supply, or diversify into non-agricultural output as desertification worsens (Dietz, Ruben, and Verhagen 2004). Poverty households are far less likely than wealthy households to have insurance or access to alternative financial instruments, such as disaster recovery loans.

In 2017, half of persons without a bank account or a mobile money provider were from the poorest 40% of households in their nations (Demirgüç-Kunt *et al*., 2018). They may also face difficulties in receiving remittances or informal, community-based services. In the aftermath of a climatic disaster, they frequently have to liquidate their physical possessions to pay for critical housing repairs and health care costs, limiting future efforts to reestablish their livelihoods and income earnings (Clarke and Dercon, 2015). Alternatively, people may cut spending to protect their assets, which can be harmful to health if food consumption and health treatment are jeopardized. This is the case in Sub-Saharan Africa, where, following catastrophic weather events, children from asset-poor homes are more likely to receive poor-quality nutrition and are less likely to be taken to medical facilities if they become unwell. If climate hazards strike in quick succession, households will have even less time to recover and rebuild their assets, potentially pushing disaster-affected households into chronic poverty and exacerbating the problem for already impoverished households (Olsson *et al*., 2014).

Poverty is also highest in many developing countries that are also vulnerable to climate change as most failed to achieve the Millennium Development Goals (MDG) target of halving poverty by 2015. Thus, traditional methods of adaptation measures would be overstretched and access to technological innovation constrained due to limited or no access to financing. In developing countries, most smallholder farmers depend on rain fed agriculture as their primary method of food production, making them particularly vulnerable to climate change impacts. However, these effects are not equally experienced among different socioeconomic groups (Belloumi, 2014; Nelson *et al*., 2007; Harvey *et al*., 2014). Research suggests that individuals and communities with limited access to financial resources are more susceptible to climate risks. For example, Sub-Saharan Africa is thought to be the most sensitive to the negative effects of climate change

due to its low adaptation ability and high levels of poverty (Esham and Garforth, 2013; Bagamba *et al*., 2012). As a result, adaptation programs must prioritize long-term sustainability while addressing the disparities that perpetuate poverty and vulnerability (Chepkoech *et al*., 2020). Finance has been identified as a significant barrier for smallholder farmers attempting to increase productivity in the face of climate change (Anang *et al.*, 2015). This is because financial restrictions frequently impede the successful implementation of adaptation solutions, posing a significant barrier to climate change adaptation (Antwi-Agyei *et al*., 2014; Atube *et al*., 2021).

Climate funding is frequently defined as resources and instruments to support and advance climate change actions (Abbass *et al*., 2022). Similarly, Ngwenya *et al*. (2020) defined climate change funding as the local, national, or transnational solicitation of funds from public, private, and alternative sources to support climate change mitigation and adaptation activities. Sub-Saharan Africa is the most vulnerable continent to the effects of climate change under all temperature scenarios that exceed 1.5 degrees Celsius. Despite contributing the least to global warming and emitting the fewest, the continent faces exponential increases in damages, posing systemic risks to its economies, infrastructure investments, water and food systems, public health, agriculture, and livelihoods, threatening to undo its modest development gains and fall into deeper levels of extreme poverty (Mavume *et al*. 2021). Over the years, the continent has received a significant amount of climate change funding through different channels, including multinational agencies such as the Green Climate Fund (GCF), Global Environmental Facility (GEF), bilateral aid from developed countries, private investments in the form of climate-resilient projects, and participation in carbon markets from development banks such as the African Development Bank, World Banks, and International Monetary Fund to address climate change (Belianska *et al*. 2022). While acknowledging these monetary instruments and the fact

that funding flow into the continent has increased over the last three decades, global finance for climate change projects in the majority of African countries is described as insufficient, inefficient, or unfair (Midgler, 2023). According to Mohieldin *et al*. (2023), strained national budgets, unsustainable debt levels linked to uncooperative policy frameworks, a lack of trust and accountability, unpredictable regulations and policies, and insufficient private sector investments impede climate funding in almost all countries on the continent.

2.5 OVERCOMING THE BARRIERS TO CLIMATE CHANGE ADAPTATION

1. **Increased investment in climate research and technology**: Climate change-related investment is broadly defined as investment in mitigation and adaptation: the former entails investing in cleaner and more energy-efficient technology to reduce greenhouse gas emissions, while the latter entails investing in critical infrastructure, technology, and activities to increase resilience and help adapt to the effects of climate change. Adaptation means reducing countries' and people' vulnerability to climate change by strengthening their ability to absorb consequences. To reach the Paris Agreement's aim of limiting the global average temperature increase to 1.5°C over pre-industrial levels, carbon emissions must be reduced rapidly. Mitigation efforts are crucial to climate action. Scaling up investment in mitigation is yielding significant results, but broadening the focus to include adaptation is also required, as people around the world are already bearing the human and economic costs of climate change, including intensified and more frequent extreme weather events. The Glasgow Climate Pact, approved during the twenty-sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, gives fresh momentum to activities that go beyond

mitigation to create resilience to the growing impacts of climate change. Climate change adaptation investment includes water management, mostly in water cycle projects (e.g., pipelines, supply, district cooling, which refers to deep ocean or lake cooling systems, desalination, storage, disposal, and treatment). Other adaptation efforts include investments in existing infrastructure, climate-resilient agriculture, and coastal protection. The use of technology in agriculture improves predictability, which helps to stabilize food systems that are weakened by shifting weather patterns.

2. **Enhanced public awareness and engagement**: Awareness campaigns can target specific groups of individuals in a region affected by a climate concern, as well as stakeholders, businesses, and the entire public. The ultimate goal of such programs is to establish long-term, sustainable behavioral changes. Individuals, company and industry managers, groups, and decision makers all benefit from increased awareness. It seeks to guarantee that all important regional and sub-regional bodies understand the effects of climate change and take measures to mitigate certain effects. Awareness campaigns are considered more effective when a variety of communication strategies are used, such as the distribution of printed materials, the organization of public meetings and training, professional consultation, communication and information via social and mass media, and the use of informal networks for information dissemination. Awareness campaigns can be combined with the formation of community self-protection teams, which promote self-reliance among residents and businesses in order to reduce the danger of personal injury and property loss (for example, during flood occurrences). The message can be transmitted using a variety of media, including television, the internet, social media, and newspapers (Manuti, 2013).

3. **Iterative adaptation approaches:** To address the challenges of uncertainty and economic constraints outlined above, there has been a new emphasis on the timing and phasing of adaptation. This has been reflected through the development of frameworks (Watkiss, 2014) that emphasize early 'low-regret' options, uncertainty-based decision-making, and iterative climate risk management. Low-regret alternatives are activities that mitigate the effects of current climate variability while simultaneously increasing future resilience. They give immediate rewards, addressing the uncertainty and discounting issues mentioned above (the economic obstacles).Weather and climate services, early warning systems, disaster risk management, and climate-smart agriculture are all examples of low-risk options. The use of decision-making under uncertainty (Watkiss *et al*., 2014) allows for a climate-smart approach to early investment decisions with lengthy lifetimes, such as massive infrastructure. It employs climate risk screening and decision-support tools that emphasize how to deal with uncertainty and avoid lock-in. Examples include developing more robust adaptation (that works well under multiple future scenarios rather than just one), incorporating flexibility into design to allow for future upgrades (as risks emerge), and utilizing diversification to protect against future uncertainty. Finally, a focus on early planning and preparation for future major risks, as part of iterative adaptive management, can help to address policy challenges and information failures. Examples include early activities that provide information to improve adaptation decisions in the future and help to keep options open (e.g. research, monitoring and piloting).
4. **Integrating adaptation into development**: The recent focus on mainstreaming may also help address some of the policy and governance barriers highlighted above.

Mainstreaming is the integration of adaptation into existing policies and decision-making, rather than the implementation of stand-alone adaptation policies, plans or measures. For example, there is an emerging focus on mainstreaming climate change into national and sector development strategies and plans (five-year plans) as well as long-term vision documents. There are several advantages. Mainstreaming integrates with the existing decision-making cycle and policy objectives, bringing adaptation closer to existing activities and enhancing current procedures. Using existing development policies as a starting point links adaptation with existing institutional responsibility and mandates, facilitating planning and execution while lowering policy and institutional barriers. Importantly, by drawing on existing activities and expenditures, mainstreaming has the ability to lower some of the additional costs of adaptation (transaction and implementation costs) while also promoting adaptation on a global scale.

5. **Monitor and learn from experience**: While these various aspects will help to address some of the adaptation barriers, the wide array of existing challenges documented in the review points to the need to develop solutions that are context-specific and tailored to the various actors involved in each decision. It is also important to recognize that there will be differences in governance, ethical dimensions, equity and value judgments as well as diverse perceptions of, and responses to, risk and uncertainty. This further strengthens the need for continuous monitoring and learning to ensure effective adaptation. (IPCC, 2014) Finally, the review examined the many priority areas for medium- to long-term climate adaptation (described above) and analysed them to determine how the various barriers may be addressed. In all cases, it was discovered that a variety of approaches were

required, including supply-type solutions (e.g., regulatory changes, better-integrated regulatory frameworks, and clarity on the roles and responsibilities of various agencies) and demand-type solutions (e.g., more sustainable use of resources and services).

CHAPTER THREE

MATERIALS AND METHODS

3.1 RESEARCH DESIGN

This study adopts a descriptive method, using a survey research design with a Likert scale questionnaire to identify the factors that contribute to individuals' failure to adopt climate change adaptation strategies. The survey method allowed for the collecting and analysis of data from respondents without changing any factors.

3.2 STUDY AREA

The research was conducted in Benin City, Edo State, Nigeria, as shown in Figure 3.1. It is bounded by the states of Kogi to the northeast and east, Anambra to the east, Delta to the southeast and south, and Ondo to the west and northwest, with the Niger River running along its eastern border. Benin City is the state capital and the main urban center. Edo state was founded in 1991 from the northern portion of Bendel state, with the southern portion forming Delta state. Benin City's population and structural complexity have increased significantly during the last decade.The population currently stands at 1,125,058. Benin City is a small, key-shaped strip of land that runs north-south in West Africa. The city is the administrative and commercial hub for both Oredo Local Government and Edo State in Nigeria. Benin City is situated at latitudes 06°19 I E to 6°21 I E and longitudes 5°34 I E to 5°44 I E, with an average elevation of 77.8 m above sea level. Benin City is a humid tropical urban settlement divided into three Local Government Areas: Egor, Ikpoba Okha, and Oredo. Their land areas are as follows: Oredo, 293 km2, Egor, 93 km2, and Ikpoba Okha, 862 km2 (Butu *et al*., 2019).

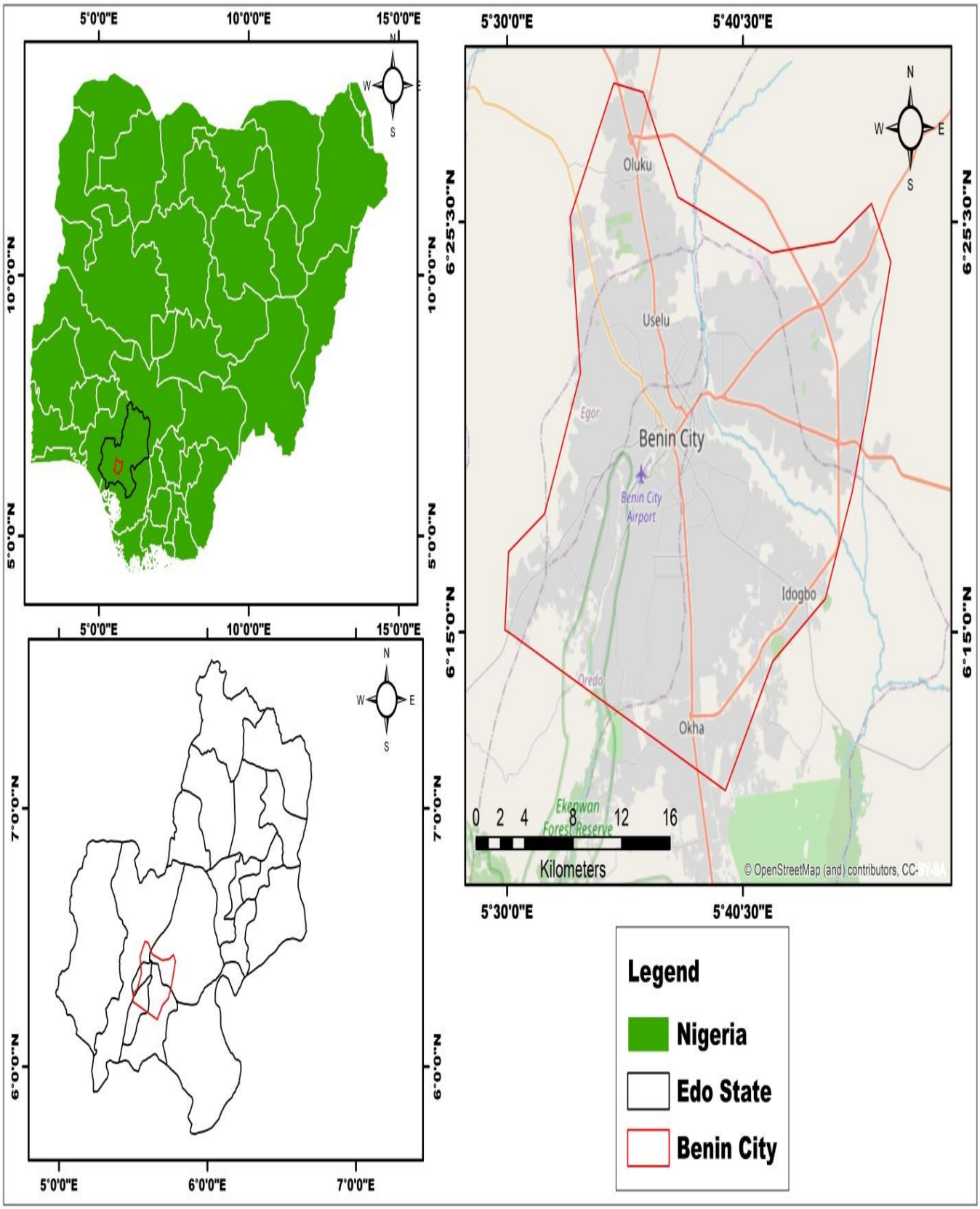

Figure 1:Map of study area (Benin City

3.2.1 CLIMATIC CONDITION OF THE STUDY AREA

The rainy season in Benin begins in March/April and ends in October/November (Atedhor *et al*., 2010). Rainfalls are of high intensity and usually double maxima with a dry little spell in August usually referred to as 'August Break' (Atedhor *et al*., 2010). Benin City is characterized by a wet season lasting from March to October, and a dry season lasting from November to February, with rainfall ranging from 150 - 300mm monthly. The temperature in the area is normally high, ranging from 26°C to 34°C, but it can reach 38 °C between February and April. Benin City is known for its high humidity levels, which range from 70 to 90%. Harmattan is also observed between December and February, and is distinguished by lower temperatures, humidity, and visibility. Furthermore, the average rainfall in Benin City is 2284.5mm, with a mean temperature of 27.7 (Odiana and Ochulor, 2024).

3.2.2 VEGETATION AND SOIL OF THE STUDY AREA

Benin City falls within the rainforest zone of southern Nigeria. Benin City is situated on a lowland plain that gradually ascends to the Esan Plateau in the north, characterized by very fertile soil suitable for agriculture (Ehizonomhen *et al*., 2023). The city is underlain by the Benin Formations, sedimentary formations dating back to the Miocene and Pleistocene era (Ehizonomhen *et al*., 2023). The soils were formed from complex basement rocks and are high in iron, which explains their distinctive red hue (Orobator and Odjugo, 2016). The environment to the north of Benin City is primarily savannah, where palm oil grows naturally. The terrain is gravelly at higher elevations and sandy as one approaches the Orle Valley. The eastern plateau is covered with diverse vegetation, including savannah in the north and woodland in the south. Where there has been deforestation, elephant grass and secondary growth take over. The soil is clayey or contains porous red sand. Oil palm and rubber grow fairly well. The Benin lowlands,

initially covered with vast rain forest, have been mostly displaced by rubber plantations. The riverine communities in the south have mainly mangrove swamp vegetation (Alens, 2016).

3.3 SAMPLING TECHNIQUE

A random sampling technique was used to select residents of Benin City for this study. This gives every individual in the target population an equal chance of being selected for the study.

3.4 SOURCES OF DATA

Primary Source of Data: Primary data was collected through questionnaires designed in 5 point Likert scale targeted at residents of Benin City. The questionnaires explores the Awareness and knowledge barriers, lack of adequate finance as a barrier, government and institutional barriers, psychological barriers and sociocultural barriers as factors behind the failure of individual in adopting climate change adaptation strategies.

3.5 METHOD OF DATA COLLECTION

The questionnaires were done using Google Forms and distributed using simple random technique to 160 respondents in Benin City. The questionnaire was designed to investigate the factors influencing individuals failure to adopt climate change adaptation strategies. The survey contained a combination of multiple-choice and Likert-scale questions. It was distributed to traders, students, workers and community member as these group represent different socioeconomic backgrounds, levels of awareness and exposure to climate change impacts within Benin City. The questionnaires explores the Awareness and knowledge barriers, lack of adequate finance as a barrier, government and institutional barriers, psychological barriers and sociocultural barriers as factors behind the failure of individual in adopting climate change

adaptation strategies. The link to the Google Form was distributed electronically via Email, social media platforms and relevant online groups to ensure wide accessibility. Using Google Form also ensured that all responses were securely stored in a centralized database, which reduced the possibility of data loss and simplified the process of exporting responses for analysis. Prior to participation, respondents were provided with an overview of the study's objectives and an assurance of anonymity and confidentiality.

3.6 METHODS OF DATA ANALYSIS

The data collected from this research was subjected to descriptive and correlation statistics. The descriptive statistics include mean and standard deviation. While the correlation analysis includes Pearson Product Moment correlation coefficient. Other descriptive statistical method that were used includes simple frequency. The reliability of the instrument was tested using reliability statistics like Cronbach Alpha. The mean, standard deviation and Pearson correlation coefficient were obtained using the formulae below:

$$\textbf{Mean } (\bar{\mathbf{x}}) = \frac{\sum x_i}{N} \quad \textbf{..... Eqaution 1}$$

Where,

Σx_i = Summation of all individual items

x_i = Mean of the *x*-variable in a sample

n = Total number of entries

$$\textbf{Standard Deviation } (\boldsymbol{\sigma}) = \sqrt{\frac{\sum (x_i - \bar{x})}{n}} \quad \textbf{..... Eqaution 2}$$

Where,

$\Sigma(x_i - \bar{x})$ = Summation of all the individual items

x_i = Mean of the *x*-variable in a sample

$\bar{x}$ = Mean of the values of the *x*-variable

n = Total number of entries

$$\textbf{Pearson correlation coefficient (r)} = \frac{\Sigma(x_i - \bar{x})\ (y_i - \bar{y})}{\sqrt{\Sigma(x_i - \bar{x})^2\ (y_i - \bar{y})^2}} \textbf{ ...Eqaution 3}$$

Where,

Σ = Summation

r = Correlation coefficient

x_i = Mean of the *x*-variable in a sample

$\bar{x}$ = Mean of the values of the *x*-variable

y_i = Values of the *y*-variable in a sample

$\bar{y}$ = mean of the values of the *y*-variable

However, Statistical analysis software like Statistical Package for Social Scientists (SPSS) was used for speed and accuracy in analyzing the data collected through questionnaires.

CHAPTER FOUR

RESULTS

The reliability of the instrument used for this study is 0.867 as shown in table 4.1

Table 4.1: Reliability Statistics

Cronbach's Alpha	N of Items
0.867	25

4.1 DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

The gender, age, marital status and educational level of the respondents are shown in Table 4.2. There were 48.8% male and 51.2% female which means that most of the respondents were female. In terms of age, 11.9% were less than 20 years, 54.5% were between 21-30 years, 18.8% were between 31-40 years and 15.0% were over 40 years. This showed that most of the respondents were in their economically productive age. This is crucial because young people could have higher tendencies to engage in carbon emitting activities and for a longtime thereby contributing to climate change. As shown in the table, 27.5% were married and 64.4% were single, indicating that the respondents were mostly single. The result also revealed that 0.6% had only primary school education, 21.3% had secondary education, 76.9% had tertiary education and 1.2% had no formal education signifying that most of the respondents were literate. Being mostly literate connotes that accepting innovations like that could help in adapting to climate change would not be a much problem in the study area. Regarding employment status, 23.1% are

employed, 34.4% were self- employed, 5.6% unemployed and 36.9% indicating that majority of the respondents have source of income. This signifies that respondents could have some financial capacity to adopt climate change adaptation strategies.

Table 4.2**:** Demographic characteristics of the Respondents

Characteristics	**Components**	**Frequency**	**Percentage (%)**
Gender	Male	78	48.8
	Female	82	51.2
	Total	160	100.0
Age	20 or less	19	11.9
	21-30	87	54.5
	31-40	30	18.8
	41 and above	24	15.0
	Total	160	100.0
Marital Status	Married	44	27.5
	Single	103	64.4
	Widow/Widower	09	5.6
	Divorced	04	2.5
	Total	160	100.0
Educational Level	Primary	01	0.6
	Secondary	34	21.3
	Tertiary	123	76.9
	No formal education	02	1.3
	Total	160	100.0
Religion	Christianity	130	81.3
	Islam	26	16.3
	Others	04	2.5
	Total	160	100
Occupation	Employed	37	23.1
	Self employed	55	34.4

Unemployed	09	5.6
Students	59	36.9
Total	160	100

Source: Researcher's computation, 2025.

4.2 Awareness and Knowledge Barriers to Adopting Climate Change Adaptation Strategies

The results as shown in table 4.3 reveals that most of the respondents agree that they are aware of the strategies for climate change adaptation. They also understand how climate change will impact their neighborhood. However, majority were not of the opinion that individual's ability to take climate action is limited due to lack of education or training. They also disagree that public campaign and climate change awareness programs are insufficient. Based on the result it can be deduced that awareness and knowledge as a barrier to adopting climate change adaptation strategies are no much a problem.

Table 4.3 Awareness and Knowledge Barriers

ITEMS	**SA Freq (%)**	**A Freq (%)**	**UD Freq (%)**	**D Freq (%)**	**SD Freq (%)**	**Mean**	**STD**	**Remark**
I am aware of the strategies for adapting to climate change.	38(23.8)	66(41.3)	23(14.4)	28(17.5)	05(3.1)	2.35	1.117	High barrier
I understand how climate change will impact my neighborhood.	48(30.0)	62(38.3)	19(11.9)	27(16.9)	4(2.5)	2.23	1.128	High barrier
Many individuals around me are unaware of climate change adaptation strategies.	49(30.6)	61(38.1)	23(14.4)	22(13.8)	5(3.1)	2.21	1.116	Moderate barrier
Individual's ability to take	57(35.6)	59(36.9)	18(11.3)	21(13.1)	05(3.1)	2.11	1.127	Low

climate action is limited due to lack of education or training.								barrier
Public campaign and climate change awareness programs are insufficient.	54(33.8)	62(38.8)	18(11.3)	21(13.1)	05(3.1)	2.13	1.117	Low barrier

Strongly Agreed (SA) = 1; Agreed (A) = 2; Undecided (UD) = 3; Disagreed (D) = 4; and Strongly Disagreed (SD) = 5. **Weighted Average (WA) = 2.21**

4.3 Insufficient Finance as a Barrier to Adopting Climate Change Adaptation Strategies

Table 4.4 reveals that majority of the respondents are of the opinion that they lack the financial means needed to adopt climate change adaptation strategies. However, Most of the respondents were not of the view that there is a lack of government funding or support for adaption measures, people are discouraged from investing in climate change adaptation strategies when the economy is struggling. They also disagree that financial insecurity is a major reason for low adaptation and that high expenses of climate adaptation measures make people avoid them. It can therefore, be inferred that in the study area, finance sufficiency is not a barrier to adopting climate change adaptation measures. This connotes that much can be done to applying adaptation strategies with little or no financial implication.

Table 4.4 Lack of adequate finance as a barrier

ITEMS	**SA Freq (%)**	**A Freq (%)**	**UD Freq (%)**	**D Freq (%)**	**SD Freq (%)**	**Mean**	**STD**	**Remark**
I lack the financial means needed to adopt climate change	36(22.5)	59(36.9)	33(20.6)	23(14.4)	09(5.6)	2.44	1.153	High barrier

adaptation strategies.								
There is a lack of government funding or support for adaption measures.	48(30.0)	77(48.1)	27(16.9)	05(3.1)	03(1.9)	1.99	0.876	Low barrier
People are discouraged from investing in climate change adaptation strategies when the economy is struggling.	50(313)	74(46.3)	27(16.9)	05(3.1)	04(2.5)	1.99	0.915	Low barrier
Financial insecurity is a major reason for low adaptation.	47(29.4)	72(45.0)	33(20.6)	05(3.1)	03(1.9)	2.03	0.893	Low barrier
The high expenses of climate adaptation measures make people avoid them.	41(25.6)	79(49.4)	31(19.4)	05(3.1)	04(2.5)	2.08	0.894	Low barrier

Strongly Agreed (SA) = 1; Agreed (A) = 2; Undecided (UD) = 3; Disagreed (D) = 4; and Strongly Disagreed (SD) = 5. **Weighted Average (WA) = 2.11**

4.4 Government and Institutional Factor As a Barrier

The data analysis as shown in table 4.5 reveals that majority of the respondents are in agreement that government initiatives concerning climate change are not trusted by the public and that government's climate change policies are not clearly stated. However, most of the respondents did not agree that policies for climate adaptation are not being implemented effectively, the effectiveness of climate change initiatives has been affected by corruption and that inadequate aid is given by local authorities to encourage adaptation. It can therefore, deduced from the study

that there is minimal barrier pose by government and institutional factors in adopting climate change adaptation strategies in the study area. This connotes that government is doing well in enhancing individuals' capacity to adopt climate change adaptation strategies.

Table 4.5 Government and institutional factor as a barrier

ITEMS	**SA Freq (%)**	**A Freq (%)**	**UD Freq (%)**	**D Freq (%)**	**SD Freq (%)**	**Mean**	**STD**	**Remark**
Policies for climate adaptation are not being implemented effectively.	39(24.4)	46(28.7)	71(44.4)	02(1.3)	02(1.3)	2.26	0.887	Low barrier
The effectiveness of climate change initiatives has been affected by corruption.	30(18.8)	68(42.5)	58(36.3)	02(1.3)	02(1.3)	2.24	0.813	Low barrier
Government initiatives concerning climate change are not trusted by the public.	28(17.5)	58(36.3)	71(44.4)	01(1.6)	2(1.3)	2.32	0.812	High barrier
Inadequate aid is given by local authorities to encourage adaptation.	31(19.4)	65(40.6)	62(38.8)	01(1.6)	01(1.6)	2.23	0.785	Low barrier
The government's climate change policies are not	26(16.3)	67(41.9)	62(38.8)	03(1.9)	02(1.3)	2.30	0.807	High barrier

clearly stated.								

Strongly Agreed (SA) = 1; Agreed (A) = 2; Undecided (UD) = 3; Disagreed (D) = 4; and Strongly Disagreed (SD) = 5. **Weighted Average (WA) = 2.27**

4.5 PSYCHOLOGICAL BARRIERS TO ADAPTATION BEHAVIOR WITH A FOCUS ON INDIVIDUAL PERCEPTIONS OF IMPACT AND RESPONSIBILITY

Table 4.6 reveals that majority of the respondents are of the opinion they do not feel obligated to act or alter their behavior in response to the potential impact of climatic-related threats such as extreme weather events or rising sea levels. They are also in agreement that seeing others in their neighborhood use adaptation strategies, increases their likelihood of doing the same. However, majority did not agree that government and large institutions have the primary responsibility for addressing the effects of climate change, rather than individuals like themselves. They also were not of the opinion that they would be more motivated to engage in climate adaptation and advocacy if they felt that their voices were heard and that their individual contributions were recognized as part of a collective effort. It can be deduced from this study that psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility is no much a problem.

Table 4.6 Psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility

ITEMS	**SA Freq (%)**	**A Freq (%)**	**UD Freq (%)**	**D Freq (%)**	**SD Freq (%)**	**Mean**	**STD**	**Remark**

I often feel that my individual actions are insufficient to have any real impact on the broader fight against climate change.	30(18.8)	50(31.3)	58(36.3)	13(8.1)	09(5.6)	2.51	1.064	Moderate barrier
I believe that the government and large institutions have the primary responsibility for addressing the effects of climate change, rather than individuals like myself.	39(24.4)	64(40.0)	45(28.1)	06(3.8)	3(3.8)	2.23	0.984	Low barrier
I do not feel obligated to act or alter my behavior in response to the potential impact of climatic-related threats such as extreme weather events or rising sea levels.	23(14.4)	59(36.9)	49(30.6)	10(6.3)	19(11.9)	2.64	1.167	High barrier
Seeing others in my neighborhood use adaptation strategies, increases my likelihood of doing the same.	30(18.8)	37(23.1)	59(36.9)	23(14.4)	11(6.9)	2.68	1.141	High barrier
I would be more motivated to engage in climate adaptation and advocacy if i felt that my voice was heard and that my individual	42(26.3)	34(21.3)	58(36.3)	18()11.3	08(5.0)	2.48	1.143	Low barrier

contributions were recognized as part of a collective effort.								

Strongly Agreed (SA) = 1; Agreed (A) = 2; Undecided (UD) = 3; Disagreed (D) = 4; and Strongly Disagreed (SD) = 5. **Weighted Average (WA) = 2.5**

4.6 Sociocultural Belief As a Barrier

The results in table 4.7 shows that most of the respondents agree that they are skeptical of climate-related advice or warnings from experts, government organizations or outsiders who do not understand the values or way of life of my community. They also agree that adapting to climate change—such as relocating or altering traditional practices—feels like a threat to their cultural identity and their connection to this place. On the other hand, majority are not of the view that because climate adaptation strategies are not widely encouraged in their social group, they often feel hesitant to implement them. They disagree that they worry that if they speak up about climate risks or take adaptation measures, others in their community might be as overly concerned. They are also in disagreement that changes in behavioral or lifestyle that could help them adapt to climate risks are discouraged by some of their cultural or community traditions. Therefore, it can be inferred that sociocultural belief is not a barrier in adopting climate change adaptation measures in the study areas.

Table 4.7 Sociocultural belief as a barrier

ITEMS	**SA Freq (%)**	**A Freq (%)**	**UD Freq (%)**	**D Freq (%)**	**SD Freq (%)**	**Mean**	**STD**	**Remark**
Because climate adaptation strategies are not	20(12.5)	13(8.1)	26(16.3)	65(40.6	36(22.5)	3.53	1.274	Low barrier

widely encouraged in my social group, i often feel hesitant to implement								
I worry that if i speak up about climate risks or take adaptation measures, others in my community might me as overly concerned.	18(11.3)	18(11.3)	22(13.8)	65(40.6)	37(23.1)	3.53	1.273	Low barrier
Changes in behavioral or lifestyle that could help us adapt to climate risks are discouraged by some of my cultural or community traditions.	20(12.5)	12(7.5)	29(18.1)	59(3639)	40(25.0)	3.54	1.288	Low barrier
I am skeptical of climate-related advice or warnings from experts, government organizations or outsiders who do not understand the values or way of life of my community.	15(9.4)	11(6.9)	30(18.8)	63(39.4)	41(25.6)	3.65	1.204	High barrier
Adapting to climate	17(10.6)	11(6.9)	23(14.4)	61(38.1)	48(30.0)	3.70	1.263	High

change—such as relocating or altering traditional practices—feels like a threat to my cultural identity and my connection to this place..								barrier

Strongly Agreed (SA) = 1; Agreed (A) = 2; Undecided (UD) = 3; Disagreed (D) = 4; and Strongly Disagreed (SD) = 5. **Weighted Average (WA) = 3.59**

4.7 RELATIONSHIPS BETWEEN PHYSICAL CHARACTERISTICS OF RESPONDENTS AND CLIMATE CHANGE AWARENESS

Table 4.8 reveals that there is a weak negative correlation between age and climate change awareness, which is statistically significant ($r = -0.291$, $p = 0.000 < 0.05$). There is also a strong negative relationship between education and climate change awareness, which is statistically significant ($r = -0.604$, $p = 0.000 < 0.05$). It can therefore be assumed that as age and education of the respondents increase, awareness to climate change decreases.

Table 4.8**:** Correlation between awareness to climate change and physical characteristics of the respondents

Variables	Correlation coefficient (r)	Significance	Relationship
Age	-0.291	0.000	Negative
Education	-0.604	0.000	Negative
Occupation	0.122	0.123	Non- significant

4.8 Relationships Between Climate Change Awareness and Psychological Barriers To Adaptation Behavior

Table 4.9 reveals moderate positive relationship between awareness to climate change and Psychological barriers to adaptation behavior which is also statistically significant ($r = 0.407$, $p = 0.000 < 0.05$). It can be inferred that the more the respondents are aware of climate change the more the psychological barriers to adopt adaptation behavior to climate change.

Table 4.9: Correlation between awareness to climate change and Psychological barriers to adaptation behavior

			Awareness	Psychological barrier
Pearson Correlation (r)	Awareness	Correlation Coefficient	1	0.407
		Sig. (2-tailed)	.	0.000
		N	160	160
	Psychological barrier	Correlation Coefficient	0.407	1

CHAPTER FIVE

DISCUSSION

5.1.1 AWARENESS AND KNOWLEDGE BARRIERS TO ADOPTING CLIMATE CHANGE ADAPTATION STRATEGIES

The study showed that awareness and knowledge as a barrier to adopting climate change adaptation strategies are no much a problem. It means that the people have knowledge of climate change is. Juana *et al*. (2013) asserted that awareness plays a crucial role in deciding the adoption of successful climate change adaptation strategies. The degree to which a community is exposed to climatic risks is reflected in its level of climate change awareness. Since awareness tends to represent a community's level of exposure to climate risks, raising knowledge is frequently seen as key to managing the impacts of climate change and lowering overall vulnerability in the early stages of the adaptation process (Ado *et al*. 2019). According to Lieske *et al*. (2014), awareness requires understanding the issue of climate change and understanding the consequences and risks that must be tackled. Even though awareness is not a big problem, action is not always guaranteed by this. There are a lot of variables that could limit or even restrict our capacity to adapt to climate change. One of the issues raised by the IPCC's Working Group II is information gaps and uncertainties. Individuals' perceptions of climate change dangers and the need for adaptation are influenced by their comprehension of the topic. Many countries have educational programs and resources in place to raise public knowledge about climate change as part of their national adaptation strategy. However, the IPCC's working group II's evaluation of adaptation barriers finds that, while more knowledge about climate change may

raise public concerns and understanding of the significance of accepting adaption measures, this is not always the case.

5.1.2 INSUFFICIENT FINANCE AS A BARRIER TO ADOPTING CLIMATE CHANGE ADAPTATION STRATEGIES

The study revealed that insufficient finance is not a major barrier to adopting climate change adaptation strategies in the study area. While some respondents acknowledged limited personal financial resources, the majority did not perceive lack of government funding, economic instability, or high adaptation costs as significant obstacles. This suggests that much can be done to apply adaptation strategies with little or no financial implication. This finding contrasts with evidence from several African contexts, where lack of financial capacity is reported as the most critical barrier (Bryan *et al*., 2013; Deressa *et al*., 2009) The difference in this study may be explained by the availability and reliance on low-cost, community-based, and incremental adaptation strategies, such as Energy conservation, low-consumption choices, community tree planting and protection of local green spaces, relying on indigenous and local practices for land, water, and resource management, allowing natural regeneration and policy and regulatory actions such as prohibiting open burning of waste, regulating single-use plastics, enforcing efficient land use and setting aside land for conservation or low-carbon transport without significant new financial outlays. Atteridge and Remling (2018) argue that in many developing regions, households adopt small-scale, low-cost adaptation measures that fit within existing resources, even when larger, capital-intensive adaptations remain inaccessible.

Also, the study showed that the respondents disagreed that financial insecurity is a major reason for low adaptation which is in contrast with (Mohieldin *et al*., 2023) which expressed that

strained national budgets, unsustainable debt levels entwined with uncooperative policy frameworks, lack of trust and accountability, unpredictable regulations and policies, and insufficient private sector investments hinder climate funding in almost all countries on the continent. This could be that the respondents might not directly perceive financial insecurity as a limiting factor if they have found alternative coping mechanisms (e.g., communal support, traditional practices). Individuals facing climate change impacts may not view financial insecurity as a primary limitation if they successfully utilize non-monetary or community-based strategies, such as social networks, traditional practices, or diversification of livelihoods, to adapt and cope with climate-related shocks. Nevertheless, finance cannot be entirely overlooked. Studies have shown that financial support mechanisms, such as access to credit, microfinance, or insurance, expand adaptive capacity and enable households to adopt more robust and long-term strategies (Fankhauser and Burton, 2011; Pouliotte *et al*., 2009). Thus, while the findings highlight that financial limitations are not a major barrier in this research study, strengthening financial inclusion and ensuring affordable adaptation options remain important for sustaining resilience.

5.1.3 GOVERNMENT AND INSTITUTIONAL FACTOR AS A BARRIER

This study indicates that government in the study area is doing well in enhancing individuals' capacity to adopt climate change adaptation strategies. However, findings indicated that government and institutional factors presented moderate barriers, especially regarding unclear climate policies and low public trust in government initiatives. Respondents generally agreed that climate policies lacked clarity and expressed skepticism toward government-led initiatives. However, they did not strongly associate corruption or weak policy implementation with

adaptation failures. This aligns with Ojha *et al*. (2016), who highlight that institutional trust and participatory governance are crucial for successful adaptation policies. Similarly, Agrawal and Lemos (2015) emphasize that adaptation outcomes are shaped not only by the presence of policies but also by the politics of implementation and the degree of public involvement. Nonetheless, the persistence of skepticism and policy ambiguity underscores the need for inclusive, transparent, and community-centered governance frameworks. This supports Pasquini *et al*. (2015), who argue that local government effectiveness improves significantly when adaptation planning is co-designed with communities.

5.1.4 PSYCHOLOGICAL BARRIERS TO ADAPTATION BEHAVIOR WITH A FOCUS ON INDIVIDUAL PERCEPTIONS OF IMPACT AND RESPONSIBILITY

It can be deduced from this study that psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility is no much a problem. Many respondents felt their individual actions were insufficient in addressing climate change and reported low personal obligation to adapt, although they were more likely to act when others in their community did the same. This reflects the importance of social norms and peer influence. Bandura's (2001) social cognitive theory suggests that individuals often learn behaviors through observation and imitation, which explains why adaptation practices may spread within communities. Adger *et al*. (2012) similarly emphasize the collective dimensions of adaptation, noting that individual decisions are frequently embedded within shared norms and values. The sense of helplessness expressed by respondents is consistent with Weber (2010), who argues that perceived lack of efficacy undermines climate action, even when awareness is high. Whitmarsh

(2011) also notes that skepticism about the effectiveness of individual contributions can create an "intention–action gap."

5.1.5 SOCIOCULTURAL BELIEF AS A BARRIER

It can be deduced from this study that psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility is no much a problem. Sociocultural factors were not considered major barriers overall, though respondents expressed skepticism toward external advice and concerns that adaptation strategies could threaten cultural identity. For instance, relocation or changes to traditional practices were perceived as risks to cultural continuity. This is consistent with Adger *et al*. (2012), who found that cultural identity and place attachment often conflict with adaptation measures that require relocation or significant lifestyle changes. However, unlike some studies where cultural norms actively discourage adaptation (Grothmann & Patt, 2005), respondents in this study did not report strong resistance from traditions or fear of stigma for adopting adaptive measures.

5.1.6 RELATIONSHIPS BETWEEN PHYSICAL CHARACTERISTICS OF RESPONDENTS AND CLIMATE CHANGE AWARENESS

The analysis revealed a negative relationship between age and education with awareness. This finding contradicts earlier studies (Muttarak and Lutz, 2014; Lee *et al*., 2015), which consistently show education as a strong driver of climate literacy. One possible explanation is that in this study area, awareness is disseminated more effectively through informal sources such as media, peer networks, and community engagement rather than through formal education systems. Pasquini *et al*. (2015) similarly highlight the role of localized communication channels in

shaping adaptation knowledge. Also, the correlation analysis showed that both age and education had significant negative relationships with climate change awareness (Table 4.8). This is counterintuitive, as education is usually associated with higher awareness. A possible explanation may be that younger, less formally educated individuals are more engaged with informal awareness platforms such as social media, grassroots campaigns, and peer learning, while older and more educated respondents may have less exposure to such channels or perceive climate change as a distant problem. This finding contrasts with studies by Deressa *et al*. (2009) and Maddison (2007), which highlight education as a positive driver of adaptation. The implication here is that educational institutions and formal systems may not be adequately integrating climate change education into curricula, leaving informal platforms to play a larger role. This underscores the importance of revising education and communication strategies to better target different age and education groups.

Also, the correlation analysis revealed a statistically significant negative relationship between age and climate change awareness, indicating that younger respondents were more aware of climate change issues than older ones. This contrasts with the study that associate age with increased experiential knowledge of environmental change (Muttarak and Lutz, 2014), but aligns with findings that younger generations tend to be more engaged with global environmental concerns through media and education (Lee *et al*., 2015). The result suggests that climate awareness in the study area is more strongly shaped by contemporary communication channels and formal learning exposure than by age-related experience.

5.1.7 RELATIONSHIPS BETWEEN CLIMATE CHANGE AWARENESS AND PSYCHOLOGICAL BARRIERS TO ADAPTATION BEHAVIOR

It can be inferred that the more the respondents are aware of climate change the more the psychological barriers to adopt adaptation behavior to climate change. This finding is significant because it challenges the common assumption that increased awareness automatically reduces barriers and motivates proactive adaptation. Instead, higher awareness may create a heightened sense of anxiety, helplessness, or "climate fatigue," where individuals feel overwhelmed by the magnitude of the problem and doubtful about the effectiveness of their personal efforts. This reflects the **"**knowledge–action gap**"** highlighted in climate psychology literature (Lorenzoni *et al*., 2007; Stoknes, 2015). The implication is that awareness campaigns, while necessary, are insufficient if they only emphasize risks without providing concrete, empowering pathways for action. If individuals are made aware of threats but not equipped with realistic and practical strategies, awareness can inadvertently reinforce inaction. For instance, respondents indicated that they are more likely to act if they see others in their community adopting strategies, underscoring the importance of social influence and collective efficacy. Therefore, interventions should go beyond simply raising awareness and should instead focus on empowerment, community participation, and recognition of individual contributions. Programs that highlight small but meaningful adaptation actions, showcase local success stories, and frame climate action as a shared community responsibility can reduce psychological barriers while sustaining motivation.

5.2 CONCLUSION

The study assessed the barriers to adopting climate change adaptation strategies in Benin City using questionnaire designed in Likert-Scale to get information from respondents in Benin City. The questionnaire was designed to investigate the factors influencing individuals failure to adopt climate change adaptation strategies. The questionnaires explores the Awareness and knowledge barriers, lack of adequate finance as a barrier, government and institutional barriers, psychological barriers and sociocultural barriers as factors behind the failure of individual in adopting climate change adaptation strategies. The result revealed that awareness and knowledge, finance, government and institutional, psychological, and sociocultural barriers are of little challenge to adopting climate change adaptation strategies. Therefore, people in the study area have little challenges in term of awareness, finances, institutional, psychological and sociocultural barriers in adopting climate change adaptation strategies. However, further study should be carried out to determine other factors that could be of major concern to adopting climate change adaptation strategies.

5.3 RECOMMENDATION

Based on the findings of this study, the following recommendations are made:

1. The negative correlation between education and awareness indicates that formal schooling is not an effective conduit. Climate literacy should therefore be integrated into curricula and supported by media and community-based outreach.
2. Awareness campaigns should go beyond information dissemination to improve self-efficacy and show the impact of individual and group actions.
3. Governments should communicate climate change policies effectively and collaborate with

communities to find solutions. Participatory approaches increase trust and improve execution.

4. To address sociocultural concerns, adaptation strategies should respect local traditions and cultural identities.

5. Adaptation initiatives should leverage peer influence by involving community leaders, networks, and role models to promote behavioral chang

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APPENDIX ONE

SAMPLE OF QUESTIONNAIRE

SECTION A: DEMOGRAPHIC INFORMATION

1. Sex: a) Male [ ] b) Female [ ]
2. Age: a) ≤ 20 [ ] b) 21 – 30 [ ] c) 31 – 40 [ ] d) ≥ 40 [ ]
3. Marital Status: a) Single [ ] b) Married [ ] c) Divorced [ ] d) Widowed [ ]
4. Religion: a) Christianity [ ] b) Islam [ ] c) Others [ ]
5. Educational Level: a) Primary [ ] b) Secondary c) Tertiary [ ] d) No Formal Education [ ]
6. Occupation: a) Employed [ ] b) Self-employed [ ] c) Unemployed [ ] d) Student [ ]

SECTION B: DEVELOPMENT OF REASERCH QUESTIONS

Kindly tick {√} the column that best indicate your opinion using the following keys:

Strongly Agreed (SA)=1, Agreed (A)=2, Undecided (U)=3, Disagree (D)=4, Strongly Disagree (SD)=5

S/N	ITEMS	SA 1	A 2	UD 3	D 4	SD 5
I.	**Awareness and Knowledge Barriers**					
1.	I am aware of the strategies for adapting to climate change.					
2.	I understand how climate change will impact my neighborhood.					
3.	Many individuals around me are unaware of climate change adaptation strategies.					
4.	Individual's ability to take climate action is limited due to lack of education or training.					
5.	Public campaign and climate change awareness programs are insufficient.					

II.	**Lack of adequate finance as a barrier**					
6.	I lack the financial means needed to adopt climate change adaptation strategies.					
7.	There is a lack of government funding or support for adaption measures.					
8.	People are discouraged from investing in climate change adaptation strategies when the economy is struggling.					
9.	Financial insecurity is a major reason for low adaptation.					
10.	The high expenses of climate adaptation measures make people avoid them.					
III.	**Government and institutional factor as a barrier**					
11.	Policies for climate adaptation are not being implemented effectively.					
12.	The effectiveness of climate change initiatives has been affected by corruption.					
13.	Government initiatives concerning climate change are not trusted by the public.					
14.	Inadequate aid is given by local authorities to encourage adaptation.					
15.	The government's climate change policies are not not clearly stated.					
IV.	**Psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility**					
16.	I often feel that my individual actions are insufficient to have any real impact on the broader fight against climate change.					
17.	I believe that the government and large institutions have the primary responsibility for addressing the effects of climate change, rather than individuals like myself.					

18.	I do not feel obligated to act or alter my behavior in response to the potential impact of climatic-related threats such as extreme weather events or rising sea levels.					
19.	Seeing others in my neighborhood use adaptation strategies, increases my likelihood of doing the same.					
20.	I would be more motivated to engage in climate adaptation and advocacy if i felt that my voice was heard and that my individual contributions were recognized as part of a collective effort.					
V.	**Sociocultural belief as a barrier**					
21.	Because climate adaptation strategies are not widely encouraged in my social group, i often feel hesitant to implement					
22.	I worry that if i speak up about climate risks or take adaptation measures, others in my community might me as overly concerned.					
23.	Changes in behavioral or lifestyle that could help us adapt to climate risks are discouraged by some of my cultural or community traditions.					
24.	I am skeptical of climate-related advice or warnings from experts, government organizations or outsiders who do not understand the values or way of life of my community.					
25.	Adapting to climate change—such as relocating or altering traditional practices—feels like a threat to my cultural identity and my connection to this place.					

APPENDIX TWO

SPSS OUTPUT

Awareness and Knowledge Barriers

Statistics

		I am aware of the strategies for adapting to climate change.	I understand how climate change will impact my neighborhood.	Many individuals around me are unaware of climate change adaptation strategies.	Individual's ability to take climate action is limited due to lack of education or training.	Public campaign and climate change awareness programs are insufficient.
N	Valid	160	160	160	160	160
	Missing	0	0	0	0	0
Mean		2.35	2.23	2.21	2.11	2.13
Std. Deviation		1.117	1.128	1.116	1.127	1.117

Lack of adequate finance as a barrier

Statistics

		I lack the financial means needed to adopt climate change adaptation strategies.	There is a lack of government funding or support for adaption measures.	People are discouraged from investing in climate change adaptation strategies when the economy is struggling.	Financial insecurity is a major reason for low adaptation.	The high expenses of climate adaptation measures make people avoid them.
N	Valid	160	160	160	160	160
	Missing	0	0	0	0	0
Mean		2.44	1.99	1.99	2.03	2.08
Std. Deviation		1.153	.876	.915	.893	.894

Government and institutional factor as a barrier

Statistics

		Policies for climate adaptation are not being implemented effectively.	The effectiveness of climate change initiatives has been affected by corruption.	Government initiatives concerning climate change are not trusted by the public.	Inadequate aid is given by local authorities to encourage adaptation.	The government's climate change policies are not not clearly stated.
N	Valid	160	160	160	160	160
	Missing	0	0	0	0	0
Mean		2.26	2.24	2.32	2.23	2.30
Std. Deviation		.887	.813	.812	.785	.807

Psychological barriers to adaptation behavior with a focus on individual perceptions of impact and responsibility

Statistics

		I often feel that my individual actions are insufficient to have any real impact on the broader fight against climate change.	I believe that the government and large institutions have the primary responsibility for addressing the effects of climate change, rather than individuals like myself.	I do not feel obligated to act or alter my behavior in response to the potential impact of climatic-related threats such as extreme weather events or rising sea levels.	Seeing others in my neighborhood use adaptation strategies, increases my likelihood of doing the same.	I would be more motivated to engage in climate adaptation and advocacy if i felt that my voice was heard and that my individual contributions were recognized as part of a collective effort.
N	Valid	160	160	160	160	160
	Missing	0	0	0	0	0
Mean		2.51	2.23	2.64	2.68	2.48
Std. Deviation		1.064	.984	1.167	1.141	1.143

Sociocultural belief as a barrier

Statistics

		Because climate adaptation strategies are not widely encouraged in my social group, i often feel hesitant to implement	I worry that if i speak up about climate risks or take adaptation measures, others in my community might me as overly concerned.	Changes in behavioral or lifestyle that could help us adapt to climate risks are discouraged by some of my cultural or community traditions.	I am skeptical of climate-related advice or warnings from experts, government organizations or outsiders who do not understand the values or way of life of my community.	Adapting to climate change—such as relocating or altering traditional practices—feels like a threat to my cultural identity and my connection to this place.
N	Valid	160	160	160	160	160
	Missing	0	0	0	0	0
Mean		3.53	3.53	3.54	3.65	3.70
Std. Deviation		1.274	1.273	1.288	1.204	1.263

Correlation between awareness to climate change and Psychological barriers to adaptation behavior

Correlations

		awareness	psychological
awareness	Pearson Correlation	1	.407**
	Sig. (2-tailed)		.000
	N	160	160
psychological	Pearson Correlation	.407**	1
	Sig. (2-tailed)	.000	
	N	160	160

**. Correlation is significant at the 0.01 level (2-tailed).

RELIABILITY

Reliability Statistics

Cronbach's Alpha	N of Items
0.867	25