

CLIMATE MIGRATION:
THE RELATIONSHIP BETWEEN HUMAN MOBILITY AND A
WARMING PLANET

by

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This thesis investigates the impact of climate change on emigration patterns relative to economic, social, political, and demographic drivers. I review the existing scholarly explanations of migration, highlighting that migration is driven by economic opportunity, political instability, sociocultural support systems, and demographic compositions as well as environmental pressures. Using hypotheses derived from that literature, I then assess the extent to which climate change, as compared to other factors, explains variation in migration trends among Armenia, Bangladesh, Kenya, and the Philippines. I selected these countries as they had relatively similar non-climate drivers of migration during the study period, but differed in their vulnerabilities to climate change. Comparing how climate disasters influence migration relative to other drivers, I seek to provide insights that policymakers could use in their efforts to address climate migration, climate impacts, and migration more generally. Analysis of changes in emigration levels showed that changes in economic conditions and political stability had significant influence on those levels. But after accounting for those influences, deeper analysis showed that a slow-onset climate changes appear to have more influence on migration than sudden-onset events.

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Introduction

How does climate change impact human migration patterns? I address this question by summarizing the literature on the causes of migration and comparing countries with similar dominant drivers of migration but that have experienced varying climatic impacts to see if climate impacts significantly increase or change emigration rates. In doing so, I attempt to investigate the complex global phenomenon of international migration that has impacted societal and demographic structures across the world. Considering the current climate crisis, this research will investigate migration through the lens of climate change and its implications for migration. Together, climate change and migration have considerable effects across multiple intersections of society that calls for the need to understand their relationship to one another. As climate change continues to increase the frequency and intensity of natural disasters, the well-being of hundreds of thousands of individuals and households vulnerable to such impacts increases as well.

A better understanding of the impact of climate change on migration will allow policymakers to reduce pressures for migration and allow preparation for safe, orderly, and managed internal and transboundary movements when they do occur. With climate change predicted to move 216 million people by 2050 (Global Migration Data Portal, 2024), understanding the relationship of climate change to migration is necessary to make such policy changes possible. However, because migration is influenced by numerous factors, the impacts of climate migration must be critically investigated. While my interest is on the effect of climate change on migration, I take account of the additional dominant causes of migration that currently drive policy creation. Climate migration is claimed to have a great potential to shift internal and international demographics as the impacts of climate change increase in frequency and intensity,

but such migration is infrequent in migration literature more generally (Scholten, 2022). Migration is more often viewed as driven by functions of the economy, political structures, sociocultural norms, and population demographics. Therefore, I compare emigration rates across four countries that experience different climatic impacts, controlling for these dominant drivers to assess the extent of the influence of climate impacts on migration. In these observations and based on the theories outlined in previous migration scholarship, I was expecting to see an increase in emigration rates in countries that experience sudden-onset climate disasters compared to their earlier emigration rates and to countries that experience little climate impacts. I was expecting that, after an initial spike in migration, the country that experiences a climate impact will have rates that return to the average trend shown in the period before the impact. However, my findings proved a much stronger relationship between migration and slow onset climate impacts than did my observations with sudden climate impacts. Further, rather than an increase in migrations following a sudden onset event, I observed inconsistent decreases in the years following the impact. These results revealed the important relationship between migration and gradually worsening climate conditions compared to migration and temporary extreme climate conditions. My findings highlight the need for migration policy to accommodate the different needs of countries who experience varying climate impacts, including those who choose to remain in place following such an event.

Research Questions

1. What impact, if any, does a climate disaster have on human emigration rates?
2. How large is the impact of climate change and climate disasters on migration compared to economic, political-institutional, sociocultural, and demographic drivers that most scholars consider more influential?

Understanding Climate Change

Before beginning a discussion on the specific details of migration, I describe the explanatory variable of interest in this thesis: climate change. I will use a variety of terms in relation to climate change throughout this paper—including climate change, climate impacts, and climate disasters—thus calling for distinct definitions of these terms and the relationships between them. Two prominent multilateral climate change focused organizations, the International Panel of Climate Change (IPCC) and the Framework Convention on Climate Change (FCCC) provide two differing, yet important definitions of climate change. The IPCC defines climate change as any change of climate over time whether due to natural variability or as a result of human activity (Pielke 2004). The FCCC builds on this understanding more explicitly positioning the changing climate as directly or indirectly attributed to human activity that alters the composition of the global atmosphere in addition to natural climate variability (Pielke 2004). Based on these, I define climate change in this paper as the warming of Earth's climate as a result of an increase in greenhouse gas emissions in the atmosphere due to human activities that exacerbate the Earth's natural climate variability. The warming of the planet, in turn, has a direct relationship to the increase in intensity and frequency of natural climate impacts such as storms, drought, rainfall, heat stress, etc. (Thornton et al. 2014). The changing of this weather variability and climate events poses significant threats to human and natural systems, therefore establishing the need to acknowledge and understand these impacts. When used in this paper, climate impacts refer to the increasing intensity, frequency, duration, and spatial extent of natural climate events such as precipitation, drought, temperature, and storms as a result of climate change. I use the term climate disaster to describe a particular impact at a given time within a specified country that has a major effect in the region it occurs in as a result of the

increasing global temperature. Climate vulnerability describes the overall exposure to climate impacts that a country has and the susceptibility each country has to climate variability.

Understanding Migration

Defining climate migration and what it means to be a climate migrant is an essential first step in expanding climate migration research, but this first starts with a clear understanding of migration theory more generally. Research on migration discourse highlights migration as a complex, interdisciplinary phenomenon (Aslany et al. 2021; Scholten 2022). My goal here is to describe migration as a multifaceted international phenomenon with a particular relationship to climate change. To do this, the following sections review theories of migration, classifying and defining migrants and the drivers of migration, finishing with the several variables that constitute each driver as a controlled independent variable.

Imperative to an introduction of migration theory is to define the terms used throughout the field. Broader migration studies classify migration into categories such as internal vs. international migration, temporary vs. permanent, regular vs. irregular, or forced vs. voluntary migrations, with each implying further categorizations of the migrants themselves from settler and temporary migrants to refugees and asylum seekers (Blocher and Milan 2017; King 2002). Blocher & Milan (2017) define migration in the broader sense as people moving within or outside their country for various reasons. They describe different types of migratory movements such as displacement and planned relocation. Each are classified below:

1. Displacement: the forced migration of people in the context of a disaster including but not limited to political conflict or environmental impact.
2. Planned relocation: the often carefully considered, voluntary movement of an individual, community, or significant population where the benefits and costs of the move are discussed.

Although there are multiple different characterizations of the countries involved in a migratory process, I will be using the two sets of terms to describe the participatory countries in a migration:

1. Sending countries: the country of origin for migrants.
2. Receiving countries: the destination country of migrations.
3. Country of origin: the country of national or habitual residence for a migrant.
4. Destination country: the desired or achieved destination country for migrants.

I will primarily use the term migration to describe the international movements from a sending country to a receiving country, however, the data I used to observe such movements uses emigration rates within each of the selected countries. The distinction between migration, emigration, and immigration, which are all commonly used terms in migration policy and literature, is critical to understand the data associated with the trends seen in each country. Migration throughout this paper is defined as any person who has moved or is moving across international borders. Emigration and immigration, then, as inverses of one another are defined as:

1. Emigration: the out-migration of those leaving a country.
2. Immigration: the in-migration of those moving into a country.

This thesis works to understand climate induced movements most clearly through the lens of displacement as environmental impacts are often categorized broadly in migration literature and databases as disasters (Scholten 2022). Therefore, another key language distinction necessary to climate migration research is defining a displaced climate migrant. Part of the difficulty in policy creation for climate migrants, however, is the lack of a clear definition for

their identity in a receiving country. Are they refugees? Are they immigrants? Are they temporary or permanent migrants?

1. Migrant: a temporary resident in a receiving country with the intention of or possibility to settle there
2. Immigrant: a migrant who has been settled in the receiving country for the period of one year or longer
3. Refugee: a migrant outside their country of origin who was forced to flee from persecution or a fear of persecution due to race, religion, nationality, or political opinion
4. Asylum seeker: a migrant in search of safety from persecution in a country other than their country of origin, awaiting the decision for refugee status (Douglas, Cetron, and Spiegel 2019)

The definitions above provide an understanding for basic terms used in migration literature and theory. Climate migration, while relatively new to broader migration studies, is defined in the discipline as the movement of people from their homes due to climate-driven hazards including slow-onset events, rapid onset disasters, or both (Ghosh and Orchiston 2022). Yet global definitions for climate migrants that are used in policy have not been globally established. Because I am centering my understanding of climate migration within the migration typology of displacement, climate migrants will be defined in this paper as migrants forced from their country of origin to a destination country as asylum seekers seeking refugee status.

Theories of Migration

Migration has shaped demography across the globe for as long as humans have lived. Because of this, scholars have distinguished theories, thresholds, sequential processes, and networks that explain variations in migration that exist globally (Aslany et al., 2021; de Sherbinin et al., 2022; Scholten, 2022). Each with their own applications to the leading causes of migration, the leading theories that will be useful to understanding migration in this paper are the aspirations-ability framework, the neoclassical theory, its adjacent push-pull theory, the new economics of labor migration (NELM) theory and the network theory.

1. Aspirations-ability framework: outlines basic mobility categories between a migrant's aspirations to migrate and their actual ability to do so by establishing different categories of mobility: voluntary immobility, mobility, and involuntary immobility (Schewel 2015).
2. Neoclassical migration theory: suggests that individuals migrate due to differences in the economic opportunities between their home and various destination options that are underscored by the notion that people will migrate if the net returns from the migration will be beneficial (de Sherbinin et al., 2022; Scholten, 2022).
3. Push-pull migration: overarching framework for migration where negative (push) factors in a sending country drive people to move away and positive (pull) factors attract potential migrants' to receiving countries (de Sherbinin et al., 2022).
4. New economics theory (NELM): centers migration around the household and family as a collective decision-making unit that works to diversify and maximize income and status at an individual level to support the larger family/economic unit (de Sherbinin et al., 2022; Scholten, 2022).
5. Network migration theory: centers the decision to migrate as a social construct that explains the existence of migrant flows and perpetuation that explains how social networks within migration influence both how migration takes place and where migrants are moving to (Scholten, 2022).

These theories are not mutually exclusive explanations but rather theories that highlight different explanations of the mass movements of people. I use these to understand the range of factors prompting migration. De Sherbinin et al.'s (2022), paper on environmental migration

theory recognizes that environmental migration has only recently been discussed in broader migration theory and is still being integrated into existing theories. This lack of engagement between environmental migration and theory in previous literature illuminates a gap surrounding environmental migration as an integrated part of broader migration studies (Hoffmann et al., 2021).

Immobility Theory and Place Attachment

Understanding the leading theories that explain migration patterns is critical to predicting how and why migration trends are the way that they are. However, an additionally critical theory to understanding migration is the one of immobility. One important and widely under discussed aspect of migration studies at large is the recognition that a majority of the global population does not in fact migrate (Schewel 2015). The long history of migration research has meant that multiple authors have examined the reasons why, despite less-than-ideal living conditions, whether economically, politically, socially, demographically, or environmentally, many impacted citizens of a nation will choose to stay in their home countries. I review the consequences of immobility and what scholars call *place attachment* to explain what keeps most of the world's population from migrating. In an attempt to answer the complex question about why people do migrate, the theory of immobility may provide a different pathway to examining instead why people do *not*. Global immobility stems from involuntary aspects like legal, financial, and social constraints as well as cultural expectations or restrictive immigration policies (Debray, Ruysen, and Schewel 2023; Schewel 2015). At the same time, however, immobility occurs voluntarily with a majority of the world's population not wanting to migrate in the first place (Debray, Ruysen, and Schewel 2023). By acknowledging the desire to remain in one's

country of origin, greater relevancy and urgency can be placed on the factors that do in fact drive migration.

Place attachment refers to the emotional bonds that people build to physical environments and is a heavily theorized concept across multiple disciplines (Inalhan, Eunhwa, and Weber 2021). The feelings that one experiences in certain places, such as their country of origin, have a significant impact on defining one's identity thus forming an place-based attachment (Giuliani 2003). In the context of migration then, place attachment plays a significant role in one's aspirations to remain in their country of origin. In fact, aspirations to remain in one's country of origin are far more common than is an aspiration to migrate (Debray, Ruysen, and Schewel 2021). Place attachments contribute significantly to instances of voluntary immobility and they work uniquely in the face of climate change. In defining the populations who remain in their home countries after experiencing significant climatic changes, the distinctions between trapped populations, those who risk becoming trapped in their countries of origin when they do not migrate in the face of worsening societal or environmental conditions, and those with place attachments must be done so with caution. Understanding trapped populations with different mobility preferences is a key aspect of creating the appropriate policy responses to climate impacts (Adams 2015). Place attachment and immobility theories are vital aspects of migration studies because they describe the reasons why the majority of the global population does not migrate throughout their lifetime which emphasizes the significance of why some people do. The United Nations notes that international migrants in 2024 only comprised around 4% of the global population (United Nations 2024). The extreme gap between those who migrate and those who do not highlights the importance of asking two questions about why the 96% do not and how extreme the drivers must be to cause the 4% to ultimately make a move.

Immobility theory provides an explanation for the decisions of the population who remain in their country of origin while simultaneously opening a space for the creation of policy to help those who stay, whether voluntarily or not.

Explaining the Control Variables: Migration Drivers

There are consistently five categories of drivers throughout migration literature that are recognized as dominant domains: economic, political-institutional, sociocultural, demographic, and environmental (Aslany et al., 2021; Arif, 2019). However, environmental drivers are often investigated in relation to the impacts an environmental change has on each of the other four categories of drivers, while economic and political drivers are often recognized as the leading drivers (Scholten et al., 2022; Jennissen, 2007). Most scholars agree on the primary drivers of migration even while acknowledging how differences among them and interactions between them determine the specific migration patterns of individual countries (Abeldaño Zuñiga et al., 2024). The following sections investigate each of these domains in further detail by characterizing the specific drivers within them. The variables—economic, political institutional, sociocultural, demographic, and environmental—each have a specific indicator that represents a specific migration driver. Each section ends with a hypothesis about their impact on migration to be compared to the effect of the independent variable of interest (climate impacts) on emigration rates.

Economic Drivers

Economic pressures are often considered as a dominant initial force prompting migration (Parrish et al., 2020; Tsuda, 1999). A major motivation for individuals and households to migrate reflect their assessment of the economic risks and rewards migrating based on the economic expectations and realities in sending and receiving countries (Tsuda, 1999; PL and Bilan, 2017). Push-pull theories contend that low economic opportunities in sending countries push migrants out to receiving countries that offer greater economic prosperity. At a macro-level these differentials can exist in unemployment rates, ineffective economic programs, job security and

opportunity, and wage differentials (Scholten, 2022; Tsuda, 1999). At a micro-level economic drivers include employment satisfaction, diversification of incomes, or declines in income (Scholten, 2022). Discrepancies between sending and receiving countries shape migration as a type of investment in a migrants own human capital (PL and Bilan 2017). For instance, countries with higher GDP or higher GDP growth will prompt migration relative to a low GDP in sending countries (Scholten, 2022). Taking the risk to move to a country with greater economic opportunity, like a growing GDP, involves the migrant relinquishing their current assets and economic position for the risk of achieving greater assets after the migrate. Therefore, economic migrations can be described as well-planned movements with calculated risks weighted against potential gains.

While migration driven by the prospect of improved economic opportunities is often a leading factor driving one's decision to move, all migration cannot rely solely on economic factors as a leading cause and must be explained by a variety of other factors. However, to account accurately for economic migrations and based on the frameworks laid out in both the neoclassical and NELM theories as well as the literature described by experts in economic migration, I am creating the following hypothesis about the indicator variable for economic migration:

Hypothesis 1: Countries with relatively low GDP will produce greater net emigration rates.

Political-Institutional Drivers

Political-institutional drivers are often the second leading drivers of migration acknowledged across migration literature (Scholten, 2022). Specific drivers related to political instances include repression, persecution, political terror, military conscription, political

instability, democracy differentials, satisfaction with democracy, and political freedom (Scholten, 2022). Moore (2003) argues that the root of political-institutional migrations, despite the economic conditions in a sending country, is fear of persecution and violence from the government and its dissidents. At an institutional level, drivers include frequent civil and political human rights violations that increase personal insecurity (Scholten, 2022).

Civil, ethnic, and religious conflict, war, and torture also fall under the political-institutional drivers as they relate to a broader feeling of insecurity towards the institutions that regulate and govern sending countries (Scholten, 2022). Political-institutional stability in any country across the globe, a life free from fear of violence and persecution describes a basic humanitarian right for all humans. However, international migrants from political-institutional instability, based on a fear of violence from terrorism or threat of persecution, are often forced migrants who may have initially been internally displaced, emphasizing an involuntary to voluntary movement (Moore, 2004). Short-term immediate impacts from political corruption, conflict, violence, and persecution, more frequently result in internal, temporary migrations. However, the impact of long-term, highly threatening political conflict has indirect effects on multiple aspects of a society, eventually driving permanent, international migrations. These indirect impacts include poor working environments, lower returns on education and health services, higher levels of unemployment, potentials for increased tax rates, and even a reduction in life expectancy, literacy, and increase in infant mortality (Cooray & Schneider, 2015). Political conflicts function non-linearly such that at low to moderate levels, movements are decreased but only to a certain threshold until at high levels, there is a direct influence between corruption and migration (Cooray & Schneider, 2015; Bohra-Mishra and Massey, 2011). Therefore, as political conflict threats increase, the citizens in a country will be more likely to

begin their movements internally until they reach a point of forced migration across international borders to avoid this political threat, creating the following hypothesis:

Hypothesis 2: Countries with low political stability and high presence of violence will produce higher net emigration rates.

Sociocultural Drivers

Sociocultural conditions impact the well-being, safety, and quality of life of people across the globe. Elements of these conditions that are particularly likely to be drivers of migration include sending/receiving differentials in opportunities of education, religion, systems of healthcare, cultural diversity, and expected social interaction in both the sending and receiving countries (Iqbal et al., 2021; Tsuda, 1999; Simpson, 2022; Wang et al., 2016). Sociocultural drivers also include public, health, and educational infrastructure (Achilli et al., 2016; Scholten, 2022). Because of its ties to multiple sections of development, educational drivers will be the prominent driver discussed under the sociocultural domain in this paper.

Sociocultural drivers are often discussed in relation to economic and political-institutional drivers as a societal area impacted by the increase or decrease of those two domains. Sociocultural aspects are often a function of the political or economic stability in both the sending and receiving country. For example, systems of poor education or weak healthcare in a sending country are more likely to serve as push factors of migration while greater education opportunity or promise of better healthcare is simultaneously pulling a migrant to a new country. The structure of the sociocultural characteristics in a sending country also play a critical role in the acceptance, view, and perception of a migrant as they enter a new country. Most receiving countries are more likely to accept highly skilled and educated migrants and more likely to bar refugees or asylum seekers, such as climate migrants. Because these migrant characteristics are

shaped by the sociocultural systems that a migrant is brought up in, opportunities for education and training play a significant role in a decision to migrate (Iqbal et al., 2021). The relationship between highly educated and skilled citizens and their intention to migrate to a country that has greater opportunity is referred to as brain-drain migration. Brain-drain migration represents the movement of the highest educated and skilled laborers and educated individuals in a sending country to seek opportunities for a better lifestyle for themselves in a new country. This specific type of migration poses a significant threat to developing countries that lack the adequate structures for education, healthcare security, or employment opportunity that would otherwise keep a highly educated member of their society in place (Iqbal et al., 2021). When specifically investigating aspects of education as a sociocultural driver, educational systems within a nation play a key role in the overall well-being, development, and livelihood of a nation. Without advanced educational curriculums, infrastructure, or reform, sociocultural systems of a country are going to be weak, limit future career and employment opportunity, and ultimately drive migration. As such, the sociocultural systems in place in a sending country have the potential to spark migration on the basis of a greater opportunity that exists in a potential receiving country. If viewed under the network theory and the NELM theory, the following hypothesis can be made about the sociocultural drivers of migration:

Hypothesis 3: Countries with low government expenditure on education will produce higher net emigration rates.

Demographic Drivers

Demographic drivers, also closely related to sociocultural ones, include aspects of population dynamics, family size and structure, age, and gender. Demographic variables have unique intersections to the previously described variables such that the migration potential of

demographic compositions of a nation rely on the statuses of the other economic, political, and social conditions within that country. For example, age structures of a nation are critical aspects driving demographic migration under the condition that a country with a high percentage young population is coupled with low economic, political, or social opportunity that will be therefore more likely to produce young migrants in search of improving their livelihoods (Samuel & George 2022). Similar demographic relationships can be drawn on family age and household structures. That is, households with elderly or children dependents who rely on the incomes of others are more likely to send a family member in search of better work or use of their educational attainment (Scholten, 2022). On the contrary side, family structures or populations with high numbers of retirees or whose dependents have left the household are likely to produce higher rates of migrants as their familial responsibilities have lessened later in life (Scholten, 2022). In this case, as the constraints by educational or employment responsibilities decrease or end, migration flows are likely to be larger because migrant lifestyles are more likely to support an international planned relocation.

One key characteristic of demographic migration that also has a significant relationship to climate change is urban population growth. Migration research emphasizes that urban growth functions as a pull factor from citizens in developing countries to areas with greater urbanization. The amenities of urban centers has been widely acknowledged as key driver of migration from pulls such as greater family and social networks and increased economic opportunity (Scholten 2022; Selod and Shilpi 2021). Diversification of opportunity is a large pull from areas where urban growth is prominent, drawing migrants towards these areas. Cities with rapid urban growth are also more likely to have the resources and infrastructure suited for migrant needs (Monras 2023). As developed countries continue to expand their urban centers, cities where population

growth is appropriately expanded on will continue to draw populations in from less-urbanized areas. Urban growth, then, has an interesting connection to emigration rates such that countries with high urban growth will draw more migrants in and send fewer out. While urban growth has a widely understood relationship to driving internal migration, its ties to international migration has been little recognized. This motivates me to observe the relationship between urban growth and international emigrations to see how or if increases in internal movements from rural to urban centers has any influence on decreasing migrations from a given country. This characteristic in conjunction with the network theory of migration leads me to the following hypothesis:

Hypothesis 4: Countries with larger urban growth rates will produce lower net emigration rates.

Environmental Drivers and the Independent Variable of Interest

I now discuss how environmental drivers are studied in migration literature. Environmental factors have received increasing attention as drivers of migration in the climate realm but receive relatively little attention throughout migration literature as a wider area of study. Furthermore, environmental factors are almost always considered alongside or studied under the economic domain (Scholten et al., 2022). Political-institutional impacts are largely absent from studies of environmental migration because of their lack of intersection (Parrish et al. 2020). The following sections analyze the literature that explains the relationship between climate change and migration. Understanding the environmental drivers of migration is critical to specifying the explanatory variables in this research.

It is widely understood that climate change is exacerbating the intensity and frequency of natural disasters across the globe (Banholzer et al., 2014; Mal et al., 2017). Environmental

drivers of migration are often discussed as impacts from natural disasters and environmental shocks (Scholten, 2022). As such, climate migration may be a response to disaster impacts, which will increase in intensity and frequency due to climate change. By reviewing the specific types of natural disasters that are exacerbated by a warming planet, we can then observe how specific climatic impacts within a country drive migration. The type of climatic shock that an individual or community experiences is perhaps the most critical aspect of a climate impact that prompts a migrant's decision to move. Disaster characterization also separates internal displacements from international migration. Most literature on climate change divides environmental disasters into two categories: sudden onset events and slow onset events. These different disaster types have different influences on migration. In the following two sections I break down the specific conditions that characterize sudden vs. slow onset climatic drivers.

Sudden Onset Disasters

Sudden onset shocks include hurricanes, torrential rains, cyclones, floods, typhoons, landslides, etc. and are characterized by displacements that tend to be temporary, over short distances, and time periods (Abeldaño Zuñiga & Suarez-Herrera, 2024). A succession of these events, as these impacts increase in frequency with a warming planet, will have greater impacts to the areas they hit. Rapid shocks quickly deplete a households' capacity to migrate and reduce the ability to undertake new, expensive movements (Kaczan & Orgill-Meyer, 2020). Countries hit with sudden onset impacts are more likely to promote in situ adaptation strategies, move internally or over shorter distances and often temporarily. Additionally, these impacts occur most frequently in developing nations where the victims are not prepared resourcefully with the correct materials, plan, or economic capacity to move internationally. The continuous threat of frequent, yet short-lived climatic disasters poses a unique threat to the people who live at risk of

these impacts creating living conditions that we should expect to drive greater migrations. Because those who experience these impacts are vulnerable economically and geographically their incentives to move are somewhat based on their preparedness to handle disasters frequently.

Slow Onset Disasters

By contrast, slow onset events include droughts, sea-level rise, desertification, and temperature increases (Abeldaño Zuñiga & Suarez-Herrera, 2024). Slow onset events are more likely to induce permanent and long-distance movements than rapid, sudden shocks (Kaczan & Orgill-Meyer, 2020). These types of impacts allow households to gather their assets and plan a migration with the necessary resources. Within these slower events, individuals and households face an adjustment period where they can decide about the best strategy to adapt to a changing environment, including the decision to migrate (McLeman, 2019). Because these types of impacts are gradual, they often produce environmental changes that are predictable based on the geography of the impacted area (Piguet, Pecoud, and De Guchteneire 2011). The clearest example of this occurs with sea-level rise that can be measured within an area of impact, based on the elevation of the coastline, and the number of people who reside in that area. Therefore, slow onset conditions have the ability to inform those at risk of the potential impacts they may face. Under the persistence of these conditions, and in the event that a household has exhausted other in situ adaptation strategies, migration rates are likely to grow.

The severity and frequency of the impact plays a critical role in the migrant's decision to move internally or internationally, a choice more often seen in environmental migrants than those who experience economic, social, or political threats. As such, the impacts of slow onset climate disasters pose differing options to those looking to migrate than do the impacts of sudden

onset disasters. Based on the above literature, I pose the following two hypotheses for the impact that slow and sudden onset disasters will have on migration flows:

Hypothesis 5a: Countries with slow onset climate impacts will lead to larger but more gradual and more long-lasting increases in net emigration rates.

Hypothesis 5b: Countries with sudden onset climate impacts will lead to a temporary spike in net emigration rates in the years following the disaster.

Methods

Finding Cases that Controlled for Dominant Drivers

Because this paper is working to compare climate impacts against more dominant drivers of migration, my research was conducted through a series of comparative case studies between Bangladesh and countries across the globe who exhibit similar control variables and differing climate impacts. The dependent variable in this research is emigration rates, seeing how these rates are influenced by a variety of different independent variable. Thus, the controlled independent variables are indicators of economic, sociocultural, political-institutional, and demographic drivers relative to the variable of interest, climate impacts. After establishing the key variables across each dominant domain of migration drivers in the literature review, I used the World Bank's World Development Indicators database to find countries who exhibit similar trends within each indicator of a control variable. The World Bank's World Development Indicators database allowed me to compare data for the indicators that represent drivers in the leading domains of migration. Within this database, I began my comparisons to data on Bangladesh, a country widely recognized as vulnerable to climate change. I ensured that not only were these independent variables controlled for similarities to Bangladesh, but also that the countries selected had varied climate impacts. This allowed me to not only look at the correlation between climate change and migration but also what types of climate impacts have more or less influence in driving migration. I focused this selection on three different aspects of climate vulnerability: little/no climate vulnerability, climate vulnerability from slow onset exposure, and sudden onset exposure similar to Bangladesh. This search revealed Armenia, Kenya, and the Philippines as comparable to Bangladesh across the four dominant drivers of migration identified in the literature review. The similarities between each of the independent variables across these

four countries can be seen in each of the figures produced in the section “Does Climate Affect Migration?” By establishing similar cases who exhibit twin trends, I was then able to move to the comparison of changes in migration attributable to the climate impacts each country experiences.

I graph each of these control variables on the same set of axes as the net emigration rates to highlight the relationship between them. By comparing these values against each other and then comparing across countries, the overall variation in migration over time and across countries can be assessed in terms of how it correlates with the indicators being assessed.

Environmental impacts are highlighted in a different way. Because these disasters cannot be shown as a trendline on a graph, the identified climate impacts in both Bangladesh and the Philippines are marked by single points on the graph. Kenya’s slow onset drought is considered as a protracted event over a long period of time and is thus not marked on the graph and because Armenia lacks a climatic impact there is also no indication on its graph.

Measuring Net Migration

To identify patterns in net emigration rates across countries that warrant explanation, I used the United Nations Department of Economic and Social Affairs’ Population Division’s global demographic indicator data portal to observe raw emigration rates over a 20-year period within Bangladesh, Armenia, Kenya, and the Philippines. My study period occurred from 1999 to 2020 where I could observe the emigration rates over last two decades when the impacts of anthropogenic climate change have begun to be felt more intensely while cutting the period at 2020 to avoid some of the major changes in emigration that may have been brought on by the global COVID-19 pandemic. The UN data portal reports raw rates of net migration as a ratio of net migration in a given year to the current population, expressed per 1000 people. After observing these rates on the UN data portal website, I exported the values to an Excel where I

could manipulate the data to be viewed more clearly. To do so, I converted the values into net emigration growth rates and graphed them to show increasing emigration rates with positive slopes and decreasing ones with negative slopes. Thus, these graphs would show an increase of migrations after a climate disaster or change in other drivers of migration.

Identifying Climate Disasters

I used both the Internal Displacement Monitoring Center's database (iDMC) and the Emergency Events Database (EM-DAT) to find one of the largest climate impacts in Bangladesh and the Philippines from 1999-2021. I relied first on the data from the iDMC because it allowed me to compare climate disasters to internal migrations which would be useful in identifying events with large impacts to Bangladeshi and Filipino populations at large. However, the iDMC database only covered events as far back as 2008, therefore creating the need for a secondary database for the first half of the study period. I turned to the EM-DAT to provide data on the disasters that occurred between 1999 and 2008.

The iDMC is compiled with data from over 39,000 disaster events across 148 countries and territories since 2008. The iDMC divides these disasters in 11 different categories: flood, storm, earthquake, drought, wildfire, wet mass movement, dry mass movement, volcanic activity, erosion, extreme temperature, and wave action. Because the iDMC records internal displacements from such disasters, I was able to select disasters on the number of internal displacements it forced in comparison to other climatic events Bangladesh experienced. I used the same process to select the climate disasters in the Philippines from 2008 to 2023.

Disaster data from EM-DAT is divided into natural or technological classifications from 2000-2025 (note: the database provides data as far back as 1900 but warns that pre-2000 data is particularly subject to reporting biases. Therefore, I only chose to use data from 2000-2008

where the iDMC left off). The database allowed me to download data from both the Philippines and Bangladesh between this time period and provides data for 46 different classifications for each disaster. Selection through these categories left me with 11 relevant descriptions including: disaster type and subtype, event name, location, origin, start and end dates, total deaths, number of injuries, total number of affected [people], and total damage (US\$). I was able to select the disasters between 2000 and 2008 that had the greatest impact in each country based on the data given in the total damage, total deaths, number of injuries, and total number of affected people categories. In selecting specific disasters from each database, I will be able to observe emigration rates in the periods before and after each event to determine whether a correlation between the two variables exists.

Display of Variables

To assess the influence of each driver on emigration rates across Armenia, Kenya, Bangladesh, and the Philippines, each figure displays data on a single independent variable for each of the four countries. This allows me to compare independent variables against emigration rates for each of the four countries. In each figure, emigration rates are shown in red while each independent variable is shown in a different color (green, yellow, purple, and blue). I position the countries in the same quadrant across the figures. Each figure displays the emigration rate relative to the left axis and the independent variable to the right axis. Figure 1 demonstrates my approach, showing the emigration rates for the four countries.

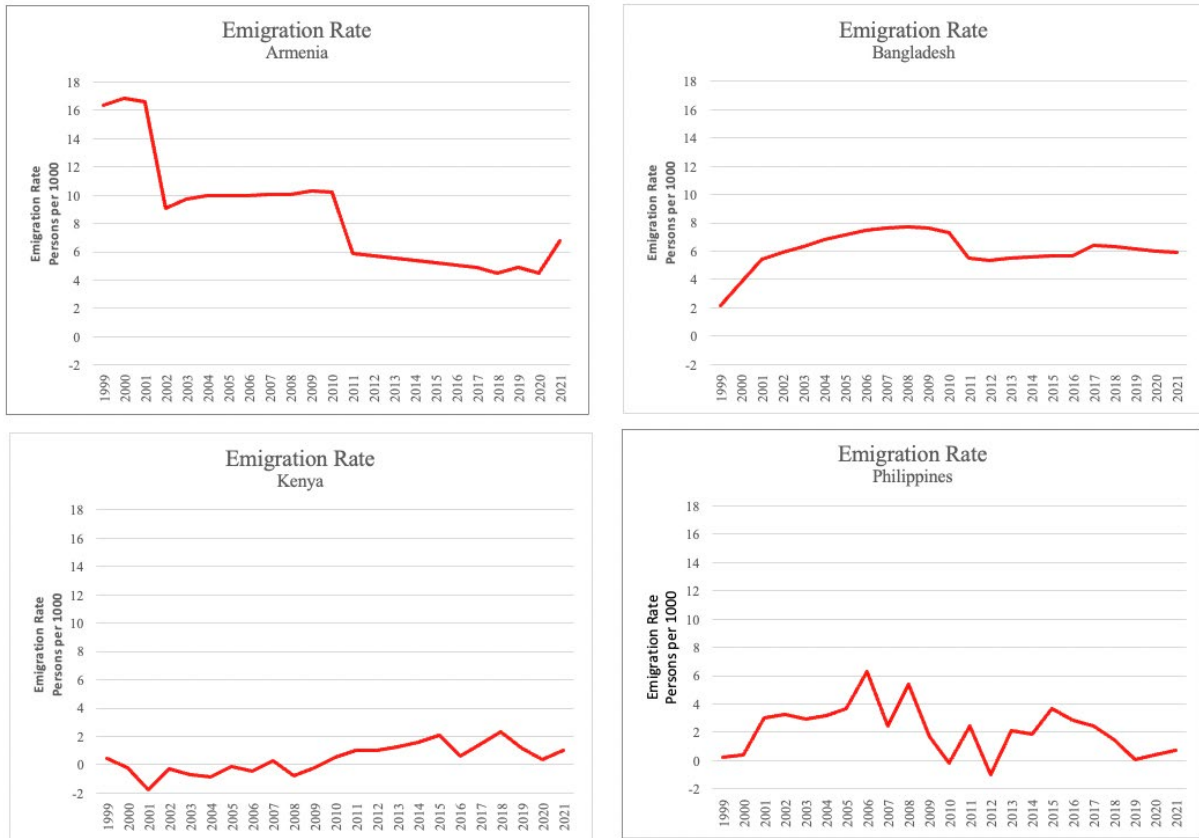


Figure 1: Emigration rates

(Department of Economic and Social Affairs and Population Division 2024)

Selecting Cases: Bangladesh, Armenia, Kenya, and the Philippines

To assess how climate disasters affect net migration rates, I selected countries that control the dominant drivers reasonably well while varying in terms of climate impacts. Because of their varying vulnerabilities to climate impacts, as well as their similarities across control variables, the four countries being compared are Bangladesh, Armenia, Kenya, and the Philippines.

Armenia represents the control case as a country with little to no climate vulnerability, Kenya represents a case where the impacts of slow onset climate impacts occur, while the Philippines and Bangladesh both represent cases of countries vulnerable to sudden onset climate impacts.

Based on the literature that defends the claim that sudden onset climate impacts may trigger inconsistent migrations, I chose to test two countries vulnerable to these impacts against each other as well as against countries with differing climate impacts to prove or disprove my original hypotheses.

Each of these countries share similar values across four variables that represent driving forces of migration across the dominant domains of migration literature. These include GDP per capita as the economic driver indicator; the estimate of political stability and absence of violence terrorism as the political-institutional driver indicator; total government expenditure on education as a percent of GDP as the sociocultural driver indicator; and the urban population growth as a percent of annual population for the demographic driver indicator. Based on the above literature review that defends each of these as dominant drivers of migration, these variables are used to control for other potential explanations for migration so that an emphasis can be placed on climate impacts (or lack thereof) within each country.

Bangladesh's Climate Impact: Sudden Onset Disasters

Bangladesh has been widely acknowledged as one of the country's most vulnerable to the impacts of climate change in the world (Ali 1999; Huq et al. 1999). Disasters such as cyclones, storm surges, floods, and impacts from sea-level rise and coastal erosion pose particular threats to Bangladesh, making it a useful country in which to analyze the impacts of sudden onset climate change. Bangladesh's climate is characterized by seasonal monsoon patterns with three distinct seasons: high temperatures and heavy rainfall in the hot summers from March to June; highest rainfall with humidity from June to October; and a cooler winter with the least amount of rainfall from November to March (Huq et al. 1999). With an already hot, humid climate, variabilities in Bangladeshi climate will significantly alter the human and natural systems within the country. In conjunction with a high vulnerability to climate impacts, Bangladesh's poor socioeconomic status leaves little capacity for the country to successfully implement adaptation strategies (Huq et al. 1999) highlighting another reason to investigate Bangladesh to observe net emigration rates. Aspects such as high population densities, widespread poverty, predominance of rural populations, and low economic growth make Bangladesh's vulnerability to climate change even more pressing. As such, Bangladesh is a useful case to investigate sudden onset climate change impacts. The next step was choosing which prominent climate event I wanted to examine as a specific disaster that posed a serious threat to Bangladeshis and therefore the potential to drive migration.

While the iDMC records over 18.8 million displacements from 2008 to 2023, one particularly impactful sudden onset impact is Cyclone Aila, which struck Bangladesh on May 25th, 2009. Cyclone Aila's impact affected 3.9 million people, killing 190 and displacing 842,000 across 11 coastal districts (Global Internal Displacement Database 2025; Saha 2017).

Damage from Aila hit most prominently in the districts of Khulna and Satkhira where over 375,000 displacements occurred alone. Saha (2017) conducted interviews with 32 households in the Khulna district who migrated from Khulna City following Aila. From these interviews, Saha divided reasons for migration into twelve push factors and three pull factors. Results showed that physical and economic damage and food insecurity were of the largest drivers of migration following the cyclone. Over 325,000 acres of crop land were completely or partially destroyed, leading to the loss of over 150,000 livestock and leaving households that relied on agriculture without an income, a home, or secure food and water sources. Because of its staggering numbers of displacements and acres of damage in comparison to other storms that have struck the country, Cyclone Aila represents one of the highest impact climate disasters to strike Bangladesh in the last 25 years. As such, I investigate changes in net migration flows from Bangladesh before and after 2009's Cyclone Aila. I used the data from EM-DAT to identify a second climatic impact in Bangladesh, a monsoonal flood of 2007. This flood affected over 13 million Bangladeshis causing over 3.4 million US\$ in damage in 2007 (EM-DAT platform 2025), highlighting an additional significant climate disaster to observe emigration rates before and after.

The Philippines' Climate Vulnerability: Sudden Onset Disasters

The Philippines experience similar climatic impacts to Bangladesh with sudden onset storms creating rapid and unplanned internal displacements and external migrations. The nation is largely vulnerable to natural disasters from its geographic positioning that exposes the country to typhoons, floods, increasing temperatures, landslides, droughts, sea-level rise, volcanoes, and earthquakes (Rincón and Virtucio 2008). Like Bangladesh, the Philippines' poverty levels exacerbate its capacity to adapt to and mitigate the impacts of climate change leaving a large proportion of the population at risk. From 2008 to 2023 iDMC recorded displacements from

storms, floods, and earthquakes to impact over 61.4 million people within the Philippines, highlighting the drastic impact that these disasters have on the region (Global Internal Displacement Database 2025). Of these, the most impactful storms occurred in 2013, 2014, and 2016. These typhoons displaced between 2.9 and 4.8 million people each and are the most deadly natural disasters in the Philippines (Rincón and Virtucio 2008). A flood in early 2012 displaced over 1.5 million Filipinos, providing another example of a sudden onset disaster having a large impact on the nation. Data from EM-DAT revealed two additional disasters in the Philippines, cyclones Milenyo 2006 and Franck of 2008. Each of these cyclones affected 3.8 and 4.7 million Filipinos respectively causing over \$570,000 in damages over the span of a year (EM-DAT platform 2025). As such, these climate impacts underscore the similarities between the types of impacts that the Philippines and Bangladesh share. My goal in selecting the Philippines as a case study country occurred with its similarity in both the control variables as well as the similar climate vulnerability to Bangladesh. By observing the trends in emigration rates between these two countries, I will be able to compare the international migration impacts that these disasters have in relation to one another while controlling for the other dominant drivers. As such, differences in migration in the Philippines will be observed with specific consideration of these disasters and how net migration fluctuates in the periods before and after these typhoons.

Kenya's Climate Vulnerability: Slow Onset Drought

Kenya's climate impacts differ from that of the impacts seen in Southeast Asia as African nations are more prone to long-term, slow onset drought. Around 90% of the climate impact that Kenya faces involves drought that leads to land degradation from heat stress on vegetation, changes in soil moisture availability, increases in soil erosion and soil nutrient loss, desertification, and an overall decline in crop yield and biomass (Hermans and McLeman 2021).

These disruptions then go on to cause adverse food shortages, decreases in water availability, and increases in food prices (Kalele et al., 2021). Of the 81 major climatic events that the iDMC identifies impacting Kenya in the last 15 years, five droughts alone between 2021 and 2023 have displaced over 316,000 Kenyans (Global Internal Displacement Database 2025). Not only does this highlight the general battle that Kenya has with drought but places further emphasis on the recency of the increasing worsening impacts of climate change. As defended by the literature review on slow onset climate impacts as well as the specific cases seen in Kenya, events such as drought that lead to food insecurity from changes in agricultural production contribute to greater economic struggles between households, thus often forcing long-term, international migration. Consequently, Kenya's climate impacts highlight a representative case of slow onset climate impacts while simultaneously controlling for other dominant drivers of migration. Therefore, when observing Kenya's emigration rates, I will do so through a lens that considers the effects of a slow onset climate impact with the expectation that migration will gradually increase over a long period of time in response to the adverse impacts drought incurs.

Armenia's Climate Vulnerability

Armenia's experiences with climate change differs from that of the previous three countries. While the iDMC provides data for environmental displacements among each of the Philippines, Kenya, and Bangladesh, there is no available data on the displacements within Armenia, even though it is country listed in the database. While I recognized Armenia as a geographically removed country from many major impacts of climate change, the lack of data available in this database was an additional tell that Armenia's case, because of its similarities among the four control variables, would be representative as the control, no-climate-impact case. Because the iDMC covers data for both disasters and conflict, Armenia's inclusion in the iDMC

database is defined by a political conflict in 2020 and 2022 with Azerbaijan rather than for a climate disaster displacements (Global Internal Displacement Database 2025). In an attempt to find information about the impacts of climate change in Armenia, I conducted a search in the Google Scholar database titled “Armenia Climate Change” that produced the most relevant articles from 2014 through 2017, which in the context of the current climate crisis may be dated and not applicable to this research. When adjusting my search then to only articles from after 2020, more specific titles included topics surrounding stressors to vegetation, biodiversity, and analyses of increasing temperatures. However, there were no articles in the last five years that included wording associated to a human impact such as adaptation, policies, health risks, practices, challenges, future directions, vulnerability, and most importantly migration. Therefore, Armenia’s net migration trends will be observed under special consideration for other drivers while acting as a control against the three previous countries who experience climate impacts more significantly.

Does Climate Affect Migration?

This section examines whether climate affects migration by exploring emigration rates against each of the independent dominant drivers of migration. By working through each of the following figures, I clarify how climate impacts affect emigration rates compared to the impacts experienced with the economic, political-institutional, sociocultural, and demographic variables identified earlier.

To start, I analyze Figure 1 to observe the emigration rate changes that each country experiences from 1999 to 2021 to see what warrants explanation. Figure 1 clarifies that all countries' migration rates fluctuate over time. The figure allows us to describe how migration rates differ across countries and over time, and thereby, identify what needs to be explained. Armenia's emigration dramatically fell after 2001 and again in 2009, meaning less people were migrating out of Armenia during those times, and significantly so. Between those times, however, the emigrations are relative stable, and following the dramatic decrease of emigrants in 2009, the rates stabilize relatively again with a gradual negative trend. In Bangladesh, we see a gradual yet relatively consistent increase in emigration from 1999 to 2010. In 2010, emigration in Bangladesh show their most dramatic decrease in the 20-year span but then stabilize at a relatively constant value for the next 10 years. Kenya's net migration rates are slightly variable across the 20-year span with increases and decreases throughout the time period. However, Kenya's overall trend from 1999 to 2021 shows a gradual increase in emigration. Similarly, the rates in the Philippines show intense increases and decreases in migration rates, specifically in the 10 years between 2005 and 2015. The rates in 1999 and 2021, however, are relatively similar to each other, indicating a relatively stable emigration rate over the study period. Each of these observations calls for an explanation of why these rates ebb and flow in the way that they do for

that particular country. The following sections discuss how the trends of each of the dominant drivers of migration compare to the emigration rates shown in Figure 1. I first attempt to explain migration through each of the dominant drivers so that if, and only if, there are gaps in these explanations, I can then test how climate impacts may play a role in explaining migration.

Economic Variable

Figure 2 tests the prediction made in Hypothesis 1 that a low GDP will increase emigration rates. In comparing emigration rates to the economic variable of interest, GDP per capita, across Armenia, Bangladesh, Kenya, and the Philippines in Figure 1, there are interesting fluctuations between the two variables.



Figure 2: Influence of GDP on emigration rates

(Department of Economic and Social Affairs and Population Division 2024; World Development Indicators | DataBank 2025).

Based on the above theory that supports the claim that low GDPs should drive migration, we should expect that dips in GDP would correlate with spikes in emigration rates. However, in cases where notable drops in GDP occur, we actually see the opposite with emigration rates dropping as well. The most indicative point where this relationship occurs is the few years following the 2008 global economic recession. In Armenia, where we see the GDP plummet from 2007 to 2009, we see emigration rates doing the same from 2009 to 2011. In Bangladesh, while there is a much smaller loss of GDP from 2007 to 2009 compared to Armenia, we still observe a reduction in emigration rates in the few years following. A similar pattern is seen in the Philippines where the economic recession from 2007 to 2009 align with emigration rate declines as well. Emigration rates following the global economic collapse of 2008 may indicate

that Armenians, Bangladeshis, and Filipinos, may have chosen in that time to gather their economic assets and remain in place. A decrease in emigration in this period then may be explained by the literature that suggests migration is a decision that relies on readily available, high economic positions. Therefore, if dramatic economic collapse occurs, which we see happen across all four countries in the years surrounding 2008, citizens who may have either wanted to migrate before or wished to migrate after such a collapse may have simply not had the economic resources to do so. In this case, economic drivers may not have led to an increase in emigration and rather may have provided an incentive to remain in place.

Kenya's emigration rates tell a slightly different story where while the initial decline in both GDP and migration occurs following the recession, the emigration rates in the few years after start to climb back to rates they were showing before 2008. Authors on Kenya's history of economic stability indicate that recovery from the recession was happening about the same time that the Kenyan government was shifting from its previous regime (Were and Tiriongo 2012). It was in this governmental reconstruction that Kenya saw a simultaneous historical growth of their economy with an initiative that implemented an economic growth recovery program, creating a relationship between the new political power and economic growth. It is following this period that we see both emigration rates and GDP per capita essentially return to their pre-recession patterns, indicating that a relatively stable increase in migration may be tied to a relatively stable, and low, GDP per capita. This relationship can be drawn with relative certainty knowing how both variables responded to the irregular occurrence of the recession.

The relationship between emigration rates and the economic variable, GDP per capita, therefore demonstrates a consistent correlation between the two variables at the time of the global recession, where economic statuses and assets were low. These findings suggest a greater

potential relationship between low economic positions and the ability to carry out a migration.

The 2008 global recession creates a perfect case to analyze the impact of economic conditions on emigration rates as GDP declines occurred relatively dramatically across the entire globe. While there were unique experiences with GDP throughout the study period, the most conclusive relationship to be drawn in these four countries is that, save for the recession, there is no major correlation between the economic variable and emigration rates.

Political-Institutional Variable

Figure 3 tests the prediction made in Hypothesis 2—that countries with low political stability and absence of violence terrorism will drive emigration rates—with the goal of drawing a conclusion about the correlation between the two variables. The relationship between these variables, seen in Figure 3, highlights some correlation between declining political stability and increasing emigration rates. Based on the theory described above that identifies political stability is a key driver of migration, we should expect to see drops in political stability align with increases in emigration rates, which is apparent at different points in each graph.

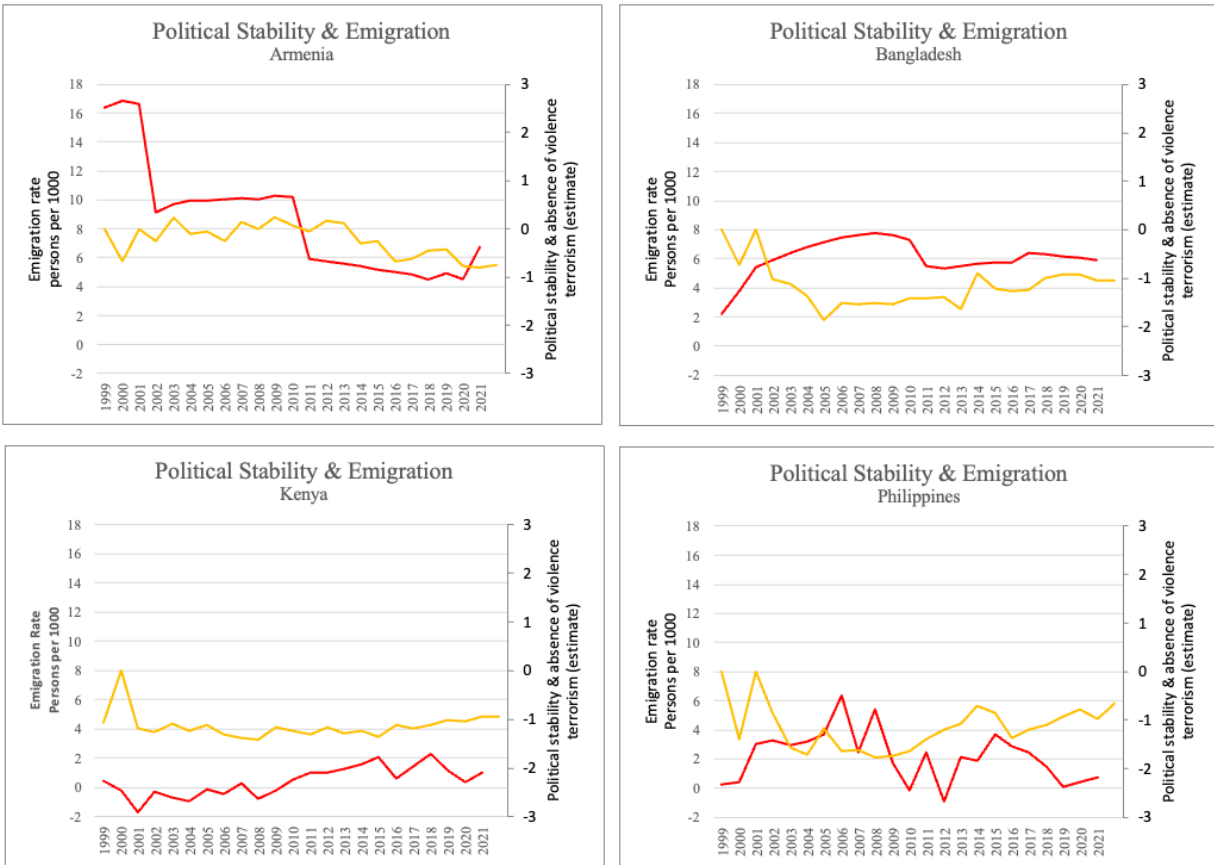


Figure 3: Influence of political stability and absence of violence terrorism on emigration rates

(Department of Economic and Social Affairs and Population Division 2024; World Development Indicators | DataBank 2025).

Apparent in Armenia's graph in this figure is the least correlated relationship between emigration rates and political stability. Armenia's political stability remains relatively constant in the 20-year study period whereas we know its emigration rates show dramatic decreases throughout this time. Therefore, it is clear that political stability in Armenia is not a driving factor of its emigration. A similar story can be told in Kenya where over the 20-year study period, the political stability of the country remains relatively stable. However, that is not to say that they are high. Therefore, it is possible that the gradual increase in emigration in Kenya from 1999 to 2021 may be a result of the low political stability that the country experiences at any

given time. Although it must also be acknowledged that there is not a strong correlation between these trendlines, leaving many alternative explanations up for debate.

Bangladesh and the Philippines, however, require a deeper explanation of the relationship between political stability and changing emigration rates. In the first 10 years of the study period in Bangladesh, we see the clear inverse relationship between political stability and migration where political stability drops and remains low and emigration rates rise and remain high. So, what happened in Bangladesh in the early 2000s that led to this institutional decline? Many authors emphasize the relationship between political stability and economic growth in a discussion around Bangladeshi migration (Chawdhury 2016; Rahman and Rashid 2018). They focus specifically on how political instability and economic growth are reciprocal to each other, that declines in political stability can lead to a decline in economic growth and vice versa. Specific instances of political instability that occur as a result of economic unrest in Bangladesh occur most consistently through *hartals* or labor strikes, mass protests, or collective action against the current political regime. *Hartals* trigger extreme instability in political and economic structures, especially when they occur multiple times in a week, as is the case in Bangladesh. In fact, one study tracks the increase in *hartals* in Bangladesh from 10-15 a year from 1983-1990 to over 50 a year from 1991-2013 (Rahman and Rashid 2018). This increase in protests against the ruling party closely aligns with the trend seen in decreasing political stability during that same time period in Figure 3. It is clear then, that Bangladesh experienced a dramatic increase in political unrest during the early 2000s that has yet to recover from its pre-1999 stability levels. As such, it is no surprise that we see emigration rates increasing over this time period as well. While these trendlines correlate with one another in the first half of the study period, both the political stability and rates of emigration in Bangladesh begin to align more closely to each other

in the second half of the period, indicating that there may be an alternative explanation needed for why emigration rates change in this time.

Like Bangladesh, we see a relative fall in political stability in the Philippines from 1999 to 2009, where at the same time, emigration rates display a relative increase. After 2009, we then see the two variables reverse, where political stability gradually increases and emigration rapidly fall. From these observations, I now ask, were there specific instances of political instability that can explain this increase in emigration? Political stability in the Philippines has been historically known as weak, with considerable corruption, few strong political parties, and election times are filled with violence, extreme spending, and fraud (Quimpo 2007). In fact, in 2001 Filipino President Joseph Estrada was forced to resign in the wake of a multi-million-peso illegal gambling conflict. Further, his successor President Gloria Macapagal Arroyo, was accused of electoral fraud and corruption. Together, these presidents held office from 1998 through 2010, during which we observe the relatively consistent decline in political stability. During these years political violence, coercion and repression were the highest they had been since the 80s categorizing both Arroyo and Estrada as the most corrupt leaders the nation had ever seen (Quimpo 2009). These instances align closely with the relative increase in emigration during this time period. When Arroyo's term ended in 2010, she was succeeded by Benigno Aquino III, whose father was president before Estrada. Aquino III was a popular president who prosecuted Arroyo, implemented a variety of administrative and political reforms, and gave further attention to government programs that assisted Filipinos in access to health and education (Abinales 2013). Despite his goals for growth, however, the Philippines limited economic capacity did not allow for the Philippines to become a fully flourishing nation under Aquino III (Abinales 2013). However, the switch in governmental regimes in 2010 is reflected in Figure 3 as the trends for

political stability after 2010 begin to increase but the limitations to growth are also reflected with relatively low stability in general. While there is a clear correlation between emigration rates and political stability in the Estrada/Arroyo terms, emigration rates between 2008 and 2016 fluctuate relatively inconsistently with the increase in political stability leaving space for an alternative explanation for emigration rates during this time. However, after 2016, we observe another correlation between increasing stability and decreasing emigration. In 2016, Aquino III was replaced by Rodrigo Duterte, a strong political leader who instituted structural changes in a radical democracy. Duterte's term was characterized by sentimental communication with the Filipino people where his voice quickly started sounding like a caring father figure (Maboloc 2020). Perhaps this political regime shift was what sent emigration rates plummeting from their previously held fluctuating increases and decreases. While Duterte's presidency still had its problems, including corruption, his popularity among Filipinos cannot be mistaken and thus provides a viable explanation for decreasing emigration rates during his term.

Together, analysis of the graphs in Figure 3 indicate that the relationship between political stability and emigration rates does exist in instances where intense fluctuations of stability occur, such as the cases in Bangladesh and the Philippines. While the political stability in Armenia and Kenya remained relatively stable throughout the study period and thus had little correlation to emigration rates, an inverse relationship between these variables is seen in the 20-year span in both Southeast Asian countries.

Sociocultural Variable

Figure 4 tests the prediction made in Hypothesis 3 about the impact that government spending on systems of education has on increasing emigration rates. The relationship between these two variables, as shown in Figure 4 below, highlights relatively few similarities between

government expenditure on education and emigration rates, only showing a correlation in a few circumstances. If sociocultural factors are to drive migration, an increase in government expenditure on education should correlate with a decrease in emigration rates, however, this is only the case for a few of the selected countries during only a few years.



Figure 4: Influence of government expenditure on education on emigration rates

(Department of Economic and Social Affairs and Population Division 2024; World Development Indicators | DataBank 2025).

Throughout the study period, education expenditures in Armenia remained relatively stable. Because we know the emigration rates dropped considerably, the relative stability of the education expenditure makes it difficult to attribute a correlation between the two. Even though the two variables closely align after 2011, this relationship ultimately says nothing about how education expenditure influences migration because we would not expect these two variables to

align at all, much less both exhibiting a negative trend. A similar case can be made for the trends seen in Bangladesh, where relatively stable education expenditure has little correlation to the changes in migration throughout the study period.

Slightly more interesting to analyze are the relationships seen in the graphs of Kenya and the Philippines. In Kenya's graph, we see a massive increase in education expenditure from 2001-2004 with the implementation of Free Primary Education (FPE). During the first few years of FPE, Kenya's Ministry of Education allocation for education grew (Mutuku and Korir 2019). In these years, increases in education expenditure largely came from grants for primary school system expansions and a donor-funded program at the beginning of the FPE period (Otieno and Colclough 2009). However, I was unable to find information about the collapse of the expenditure after 2005. A review of Kenya's education reforms that mentioned briefly that a challenge with education reform in the 21st century was that there was "corruption and mismanagement of the FPE funds from 2008-2010" when "the donors stopped funding free primary and secondary education to date in the country" (Muricho and Chang'ach 2013). Further, my indicator variable for the sociocultural driver describes *government* expenditure on education, not private funds, making the search for such explanations more difficult.

A need for explanation exists in Figure 4 for the Philippines as well. After 2015, we see the relationship that we would expect to from an increase in education expenditure and a decrease in emigration. So, are these trends related? Might the education expenditure increase tell us more about a greater social change occurring after 2015 that led to a decline in emigration? The education reform that occurred in the 2015-2016 school year might tell us yes. Under the 2015 General Appropriations Act, the Philippines Department of Education had its highest education budget to target the Philippines growing population and thus growing need for

education reform (Naldoza 2015). The president of the Philippines in this time of reform, President Aquino, stated that education is a top budget priority and increase the budget of the education sector by 21% to nurture the potential of the Filipino people through higher education (Naldoza 2015). This budget increase was allocated across several aspects of the Filipino education sector including a K12 Education Program that would hire more than 39,000 teachers and fund the construction for over 31,000 classrooms in 2015 (Aquino 2015). Aquino believed that increasing the quality of education in its youth would improve the outcomes along the entire chain of the Filipino education system therefore allocating 364.9 billion Philippine peso to the Department of Education in the 2015 National Budget (Naldoza 2015). It is this increase in education expenditure that we observe in the Philippine's graph in Figure 4. The 2015 National Budget aimed to form a "budget for inclusive and sustained development" across several aspects of the Filipino economy (Aquino 2015). The magnitude of economic and sociocultural sectors that the 2015 budget increase covered provides a viable explanation for the decrease in migration observed in the years following.

The correlations between the sociocultural variable of education expenditure and emigration rates in Bangladesh and Armenia show little relationship to each other. However, there are two strong correlations between education expenditures and emigration rates in both Kenya and the Philippines in the second half of the study period. These findings indicate the circumstantiality of the sociocultural variable where a dramatic policy and economic change that triggers expenditure changes will have an impact on changing emigration rates.

Demographic Variable

Figure 5 tests the prediction made in Hypothesis 4 about the relationship between urban growth and emigration rates. Figure 4 demonstrates that there is little correlation between urban

growth and emigration rates in Armenia, Bangladesh, Kenya, and the Philippines. Based on the theory described above if demographic factors are to explain migration, an increase in urban growth rates should align with a decrease in migration.

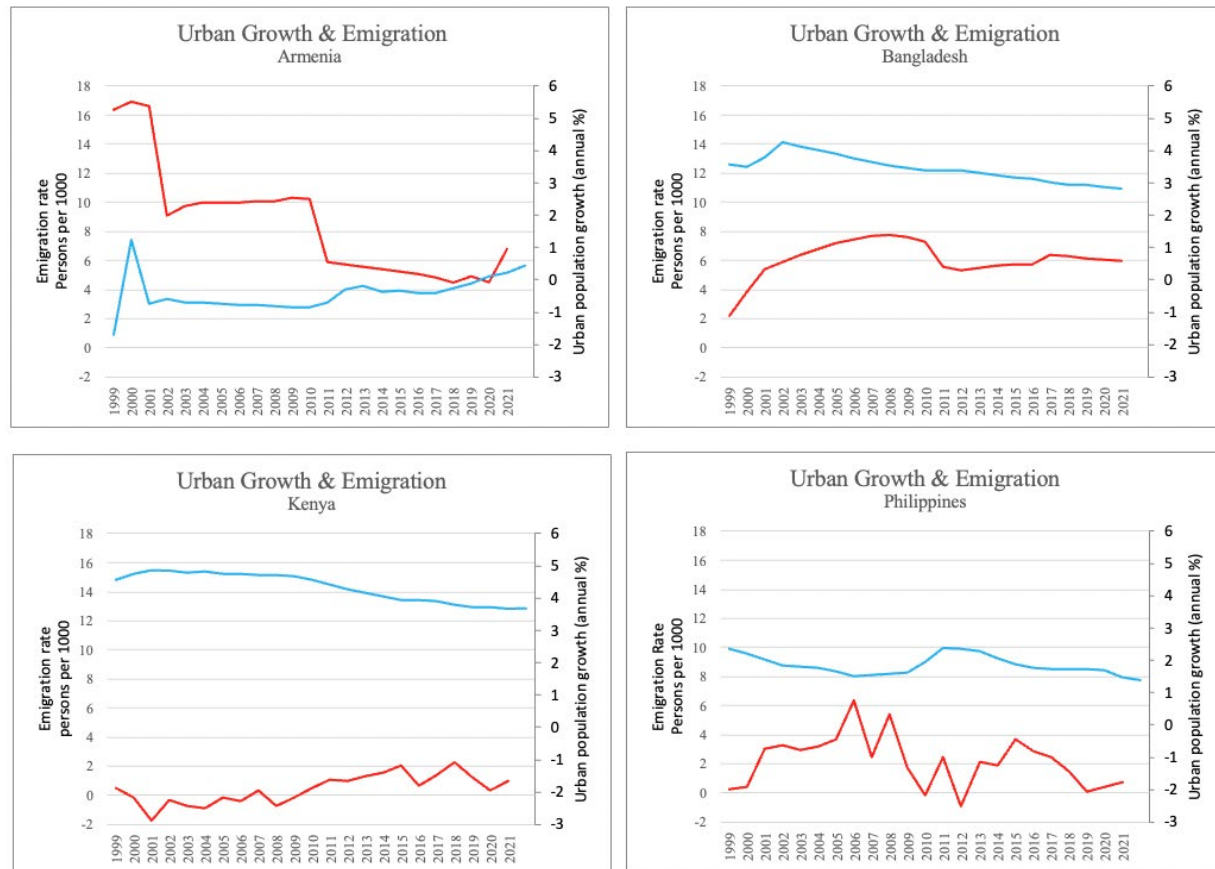


Figure 5: Influence of urban population growth on emigration rates

(Department of Economic and Social Affairs and Population Division 2024; World Development Indicators | DataBank 2025).

While Figure 5 does not show a direct relationship between the increases and decreases in urban growth and migration like the ones investigated in the other figures above, this relationship must be explained from a broader perspective. Demographic migration theory argues the claim that high urban growth rates in a country are likely to generate less migration out of that country, a relationship clearly shown in Kenya whose urban growth rates are significantly

higher than the contrasting three countries. In fact, this claim can support the differences seen in both Bangladesh and the Philippines as well, who's urban growth are both relatively similar to each other and relatively high. In such cases, low emigration rates are supported by migration theory. In contrast to these trends, however, are those seen in Armenia, who's urban growth rates are relatively stable at a much lower level. In this case, we would expect low urban growth rates to correlate with relatively high emigration rates, which is not apparent in Armenia's migration.

Each of these instances suggest the relatively weak relationship between urban growth and migration. There are additional complexities with linking these variables together such that without proper data availability (in the context of this paper, these include time and resource restraints) a relationship between these two variables is difficult to identify.

Environmental Impact

Finally, Figure 6 tests Hypotheses 5 (a) and (b) to assess the relationship between climatic experiences and increasing emigration rates. The previously established climatic disasters experienced in both Bangladesh and the Philippines are marked with black Xs in the years that they occurred. Based on the theory described above, following instances where sudden onset disasters occur, we should expect to see a rapid increase in migration in the few years following the events. While in this figure there are no marks for the independent variable on Armenia or Kenya's graphs, each will still be discussed under the predictions for their experiences with climate change, little to none for Armenia and slow onset for Kenya. Under slow onset conditions, we should expect to see a gradual increase in migration over time while in an area with little to no climatic impact, migration should be attributable to another independent variable.

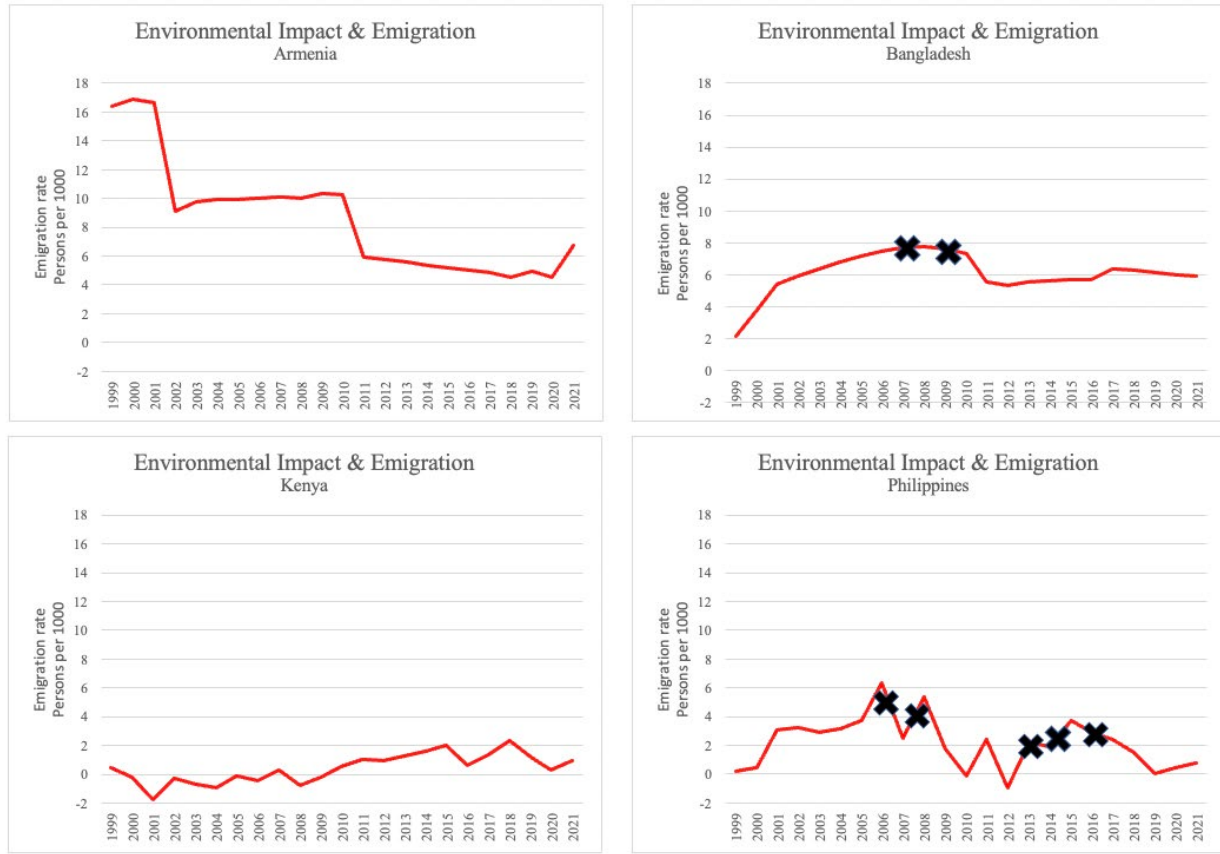


Figure 6: Influence of climate impacts on emigration rates

(Global Internal Displacement Database | IDMC - Internal Displacement Monitoring Centre 2025;
World Development Indicators | DataBank 2025).

Starting this discussion with the emigration rates seen in Armenia, after the other variable explanations above, it would seem naïve to conclude that the decrease in migration over the study period correlate to a lack of climatic impacts in Armenia. However, this section is aimed at doing just that. Therefore, if observing these decreases through a lens that solely acknowledges climatic impact, then these decreasing trends would indicate that a country with low vulnerability to climate change would not drive large migrations and in fact have migration decreasing over time. Yet, it may be difficult to attribute this claim to the trends seen in Armenia because rather than seeing a relatively stable or continuous decline of migration, we instead see rapid declines

in 2000 and 2010, which as described in the Methods section above, we know were not driven by climate impacts, as those did not occur.

The migration trends in Kenya, when compared to the slow onset experience of drought that the country experiences, show a clear representation of what we would expect them to under such conditions. Scholars of Kenyan migration emphasize the impact of drought on Kenya's agricultural systems, driving migration from areas with low labor forces, food security, and sense of community due to competition for resources (Gittard 2024; Willett and Sears 2020). While this evidence may provide a viable explanation for the increasing migration we see in Kenya's graph in Figure 6, I investigated whether the years of more rapid migration increases, such as 2008 or 2016, were also years of more intense drought. I found that both years where there was a rise in migrations, also were La Niña years. During La Niña years, countries in Eastern Africa experience drier-than-normal conditions causing massive disruptions to agriculture and therefore food security and labor forces. In fact, during the 2016 drought, over 3 millions Kenyans were in need of food aid as drought-attributable food insecurity devastated the nation in 2016 and 2017 (Uhe et al. 2018). The 2008/2009 drought was marked with record high livestock mortalities and below average vegetation growth posing extreme challenges to the livelihoods of farmers (Zwaagstra et al. 2010). Coupled with Kenya's already arid conditions, La Niña years threaten climatic conditions, making them usually drier and more difficult to live in. It is no surprise, then, that we see increasing migration in the years following this impact as Kenyan's living in these conditions can anticipate over several years whether or not their livelihoods will be able to adapt to such changes. More specifically, in the years amidst or following a drought, Kenyans can gather their economic assets, question their in-situ adaptation strategies, and make collaborative household decisions about whether to migrate.

The graphical analyses of Bangladesh and the Philippines differ from those for Kenya and Armenia. Based on the data from the iDMC and the theory about sudden onset disasters, we should expect in these countries to see spikes in emigration rates in the years following the marks on their graphs. The emigration rates in the Philippines, however, appear to show no consistent change in the years following the five identified disasters. Emigration rates fluctuated in each one, falling after 2006, rising in 2008, steady after 2013, increasing dramatically after 2014, and falling again along the trend that had previously been established after 2016. While the data from the iDMC suggests that the three later events contributed to massive internal displacements, the emigration trends show inconclusive results about the relationships between international movements and a sudden onset climatic impact. Dramatic fluctuation in emigration rates began most intensely following 2005. So, in an attempt to expand disaster impacts before the data available from the iDMC, I used the EM-DAT data to gain a clearer understanding of whether climatic events became more frequent, intense, or differentiated after 2005 than before. The two identified disasters in this time frame, from 2005-2008, however, again show inconsistent emigration trends. While each of these disasters had massive impacts inside the borders of the Philippines including economic losses, deaths, internal displacements, and infrastructure destruction, the emigration rates in the years following each event showed an increase in only one year, and even that was a continuation of a previous pattern.

Emigration rates following the two major disasters in Bangladesh show an interesting trend. While there is little fluctuation after the 2007 monsoonal flood, following Cyclone Aila of 2009 emigration rates actually fall dramatically from its previous consistent climb rather than an expected initial increase following such an event. This change calls for an explanation to understand if this decrease in migration correlates with Cyclone Aila. Place attachment was the

first thing that came to mind when searching for an explanation of why a decrease in migration may be tied to a massive climatic event. In fact, in one survey of about 150 non-migrant households conducted in the aftermath of Aila, most remained in place from a firm attachment to their homes, emotional bonds, coping capacity, social networks, and economic statuses (Ahmed, Atiqul Haq, and Hyder 2023). The study emphasized the coping capacity of different households, their ability to manage severe climate events, and what processes occur in the decision to emigrate following such an event, such as Aila. The study attempted to answer the question about the decision-making process through the specific motivations non-migrating households had during the process. The findings strongly correlated with a sense of place attachment and voluntary immobility theory. The decisions of non-migrants are as follows: 8% were among older people who desired to spend their final days in their homes; 11% remained in place due to a strong sense of belonging and familiarity; 13% chose their communal social bonds, close-knit relationships, and friendships as a reason to stay; 16% were rooted in an emotional attachment to place; 19% expressed attachments to indigenous homelands, ownership of property, and established way of life; while the final 27% came from influences of resource availability, specifically, fishing opportunities (Ahmed, Atiqul Haq, and Hyder 2023). Clearly, non-migrating decision factors following a climatic event as intense as Aila correlate closely with the place attachment explanation of immobility theory. While this may be a viable explanation for why emigration rates do not show an increase following the cyclone, I was still determined to find some piece of evidence tying Aila to why they showed such a dramatic decrease. Perhaps it was the immediate and intense livelihood stress, impact on the socio-economy, and immediate challenges faced by those in already poor living conditions.

Migration scholars who take into account the impact of climate change on migration understand immobility following a disaster under two primary contexts: voluntary environmental non-migration and trapped populations (Mallick and Schanze 2020). Each of these explanations can provide viable support for the decrease in migrations seen in the years following Cyclone Aila. These explanations relate back to the aspirations-ability framework defined in the introduction of this paper that emphasizes the relationship between the desire to move and the ability to do so. However, scholars of climate migration recognize the distinction for climate migrants to be trapped or voluntarily immobile (Mallick and Schanze 2020). Appreciating the differences in migrants and non-migrants' desires and abilities to migrate after a climate impact is critical to understanding why migrations decrease following a climate disaster. While it is critical to acknowledge that some of those impacted by Aila may have not wanted to move because of their place attachments to their homeland, the trapped population explanation provides support that some of those impacted simply may not have been able to emigrate.

The observations from each graph in Figure 6 reveal critical relationships between migrations and differentiated climate impacts. These correlations supported the hypothesis about slow onset disasters in Kenya, as well as the understanding about a lack of climatic impact in Armenia. The patterns seen in the years following the sudden onset disasters in Bangladesh and the Philippines do not support the original hypothesis about an increase in migration in the years following the impact and rather highlight an inconsistent relationship between sudden onset impacts and migration.

Discussion

Hypothesis Analysis

The following section will interpret the results found above in comparison to the predictions made in the hypotheses in the theoretical sections of this thesis. The findings from each of the above figures reveal significant correlations among country specific dependent and independent variables of migrations and dominant migration drivers. The analysis shows the complex, fluctuating impacts that dominant drivers of migration have on emigration rates over the study period. I start with the independent variable of interest, climate change, and then systematically review the other variables to strengthen my conclusions about migration and climate change. The correlation between the climate impacts and emigration rates revealed that slow onset disasters seen in Kenya have a strong influence on emigration rates over a 20-year period as compared to the sudden onset disasters seen in Bangladesh and the Philippines. The relationship supports the hypothesis about slow onset disasters that predicts a gradual increase migration overtime but does not support the hypothesis that sudden onset disasters should spike emigration rates in the years following the impact.

The trends seen between the other drivers and emigration rates were able to provide explanations for why, if not for climate, emigration rates in each of the four countries were changing. The relationship found for the economic variable did not support the hypothesis about declining GDPs and increasing emigration rates and rather showed the inverse relationship in one consistent circumstance across all four countries, the 2008 recession. The relationship between the economic variable and migration was otherwise relatively uncorrelated throughout the study period. However, all countries also have a relatively low GDP throughout the period which may indicate a consistent “push” need or desire to emigrate to better economic conditions.

Similarly, the political-institutional variable provided explicit explanations for the fluctuations for some years in Bangladesh and the Philippines but showed little correlation to the changing emigration rates in both Kenya and Armenia. The patterns shown in Armenia and Kenya, whose countries do experience low political stability, does not support Hypothesis 2 that low political stability should drive migration but the trends in Bangladesh and the Philippines do support this hypothesis in a few specific years. These findings emphasize the interaction of political stability with other factors in driving emigration rates, with low stability alone not driving emigration rates unless other factors were in play.

The sociocultural hypothesis that predicted that a low education expenditure would correlate to high emigration rates was not supported by the trends seen in Armenia and Bangladesh and was only supported by the trends seen in the Philippines and Kenya in a few years. However, there was a relatively strong correlation between these variables in the Philippines in the later years of the study period, indicating the contingency of this relationship on other factors. These trends indicate that the relationship between low education expenditure and high emigration rates are also tied to changes in other economic and political aspects within these four countries. The similar conclusion can be drawn about the demographic variable where high urban growth rates showed little correlation to emigration rates where research restraints prohibited a more conclusive relationship from being drawn. The results of the sociocultural and demographic drivers indicate that the conditions of these variables across the four case study countries had little connection to driving migration during the study period. While there were a few years where the sociocultural driver aligned with its hypothesis, there was not enough concrete correlation to conclude that education expenditure was responsible for driving migration. The same claim can be made for urban growth rates.

Applications to the Discipline

Clearly, the relationships between emigration rates and different independent variables provide a range of conclusions about what variables drive migrations. My findings shed light on various aspects of migration studies. With an emphasis on the impact of climate change on migration, the correlations found between slow-onset and sudden-onset disasters in comparison to the other dominant drivers of migration has critical applications to changing the way that policy makers go about the creation of migration policies. Because this study aimed to control for a variety of dominant drivers of migration, it brought the final explanation for migration to climate impacts. By doing this, the observed change in emigration rates allows for better informed decision making in light of different climatic experiences.

The evidence found that slow-onset climatic impacts have a higher and more consistent relationship to driving migration is vital to shaping the way that international relationships are built between sending and receiving countries of these movements. Further, the observations supporting place attachment and immobility of those who face sudden onset impacts provides valuable evidence for guiding in situ adaptations to such impacts, mitigating their effects, and expanding post-disaster relief.

These findings produce a variety of pathways for migration policy and research to focus on in the future. As climate change continues to increase the frequency and intensity of natural disasters, those impacted by each event will be faced with continually worsening living conditions. The findings from this research prove that there is a need for migration policy to address a variety of different personal needs in the aftermath of these disasters including both the desire to move in slow onset conditions or the desire to remain in place after a sudden onset impact. Because this research considered the other dominant drivers of migration, it pushes

migration policy to continue to use a multidisciplinary approach when implementing new practices. The observations from the graphs of each of the independent variables reveals the complex relationship between climate change and the dominant drivers of migration, emphasizing the importance of migration policy to continuously adapt to and refresh its conditions and coverage. That said, this research also exposes the need for a renovated approach for migration data collection in order to accurately form policy around data-driven, numerical evidence. The following section emphasizes the gaps in migration research and this research specifically.

Limitations & Future Research

A critical limitation in any analysis of migration is the complexity of data collection. Multiple authors recognize the uncertainty in migration data in general and in particular, the migration data relating to climate change (Bilsborrow, 2016; Hoffmann & Vinke et al., 2023). Not only do many countries lack systems for monitoring migration in the first place but often the collection periods of public data sources such as surveys and censuses are often not administered frequently enough, may include sampling biases, and can result in a severe undercounting of migrants (White, 2016). Hoffmann & Vinke (2020) explain this lack of data systems in place for climate migration specifically occurs because the countries that these movements occur in are often those with limited government, limited funding, lack of weather stations, incomplete historical data, with few universities or research institutions existing to produce climate migration data. Additional difficulties in migration data collection on a more general scale include gaps in definitions that characterize migrants or ambiguous understandings of the type of determinant that drives the movement, a lack of diversity in the collection of knowledge on migrants, a lack of collection of longitudinal data, and a lack of specialized data collection systems unique to the vulnerable area (Bilsborrow, 2016; Hoffmann & Vinke 2023). This complexity may explain the trends we observe in periods within Armenia and Bangladesh, with little to no variance between their annual migration rates. With research done on any complex fields of study, the limitations to such results must be included and climate migration is no exception. The growth of research around this topic must continue to grow as climate migrants increase across the globe so that effective policy implementations can be based in quantitative evidence and those who are vulnerable to such movements receive adequate representation.

In addition to the general limitations of migration data, there are limitations for the applications of my research as well. The biggest limitation of conducting research through specific case studies is the ability to apply the findings within countries studied to other countries. Because I chose to focus only on the variables within four countries, it may be difficult to apply my findings to others. However, careful selection of control variables and multiple different explanations for the movements within my four studied countries means that I am able to draw a conclusion with confidence about what is driving migration in those four countries. That being said, this limitation provides a pathway for future research to expand on the methods used here across several more countries. Because of time constraints, I was limited to assessing migration drivers for only four countries. If given more time, I would expand this research method to include more comparison cases of countries across the globe who experience differing climatic impacts to draw more conclusive findings about climate impacts on migration. In an ideal world with a plethora of time and money, this research would benefit greatly from field work in the selected countries including interviews and surveys with locals who can provide primary source opinion about the decision to or not to migrate.

Conclusion

This paper analyzed the relationship between a warming planet and human migration by studying four countries who experienced different climate impacts. I focused on observing the impacts of climate change by comparing emigration rates across countries while controlling for other drivers of migration. Through an explanation of existing theories of what drives migration, I hoped to provide an introduction to this complex phenomenon and its growing relationship to climate change. Revealed in the review of theory were the five dominant drivers of migration, economic drivers, political-institutional drivers, sociocultural drivers, demographic drivers, and environmental drivers. The literature on these theories allowed me to select specific variables within each domain that influence migration. These created the independent variables for the research including GDP, political stability and absence of violence terrorism, government expenditure on education, and urban growth rate with the variable of interest being climate disasters. I selected each of the four countries based on the similarities they shared across each the first four but that experienced differing climate impacts. I graphed these drivers against the dependent variable of emigration rates. My comparative method controlled for other drivers of migration to assess the impact of different climate impacts.

Utilizing data from the UN Department of Economic and Social Affairs' Population Division's global demographic indicator data portal, I observed variation in emigration rates over time and across Armenia, Kenya, Bangladesh, and the Philippines. Using the World Development Indicators database, I identified correlations between the independent variables and the emigration trends, where they existed. This research allowed me to draw conclusions about the impact of each variable on migration and whether the climate experiences of each country were driving emigration rates. I found a strong inverse correlation between the economic

variable of GDP and migration during the 2008 global recession across all four countries and a few other circumstantial correlations between GDP and migration throughout the study period in Kenya. The political-institutional variable suggested a weak relationship between political stability and migration in Armenia and Kenya but that throughout the 20-year study period, the fluctuating emigration rates in Bangladesh and the Philippines could be explained by political stability in a few specific years. The sociocultural variable of education expenditures correlated strongly in only two of the case study countries in the latter half of the study period while the demographic variable had a relatively weak correlation to the changing emigration rates. Both of these relationships might be able to be shown more conclusively with deeper research. The environmental variables were identified using the Internal Displacement Monitoring Center and the Emergency Events Database. Each of the four countries experiences a different climate impact from little to no impact in Armenia, slow onset in Kenya, and differing sudden onset impacts in Bangladesh and the Philippines. The differences in climate impacts allowed me to draw a conclusion about the types of climate impacts most influential in driving migration. These observations revealed a strong correlation to driving migration from slow onset impacts, and inconsistent fluctuations in the years following sudden onset impacts that highlight the tendencies for voluntary immobility and preferences to remain in space due to place attachment.

My findings across these variables provide important insights for future climate migration studies. The correlations between migration and each of the dominant driving variables indicates the need for a multi-disciplinary policy approach to addressing climate migration. The observations from the slow onset impact in Kenya suggests the need for greater migration policy that eases the migration process from a sending and receiving country as the impacts from the slow onset disaster will worsen living conditions gradually, driving long term,

well-planned migration over time. Because migration following a sudden onset impact was inconsistent, these findings suggest the need for policy that addresses in situ adaptations following a climate disaster so that those living in impacted areas can maintain their livelihoods given continuously degraded environments. While climate impacts continue to worsen and impact those living in affected areas, it is imperative to recognize the needs and desires of both migrants and non-migrants whose economic, political, sociocultural, and demographic positions differ. The observations made in Kenya, Bangladesh, and the Philippines emphasize varied experiences of climate migrants who share otherwise relatively similar development conditions.

Taken as a whole, the emigration rates of the four countries across the study period emphasize the complexity of migration research and the ability to attribute any single person's migration to a single cause. When viewed across all independent variables together, migration can only be explained through a combination of drivers, something already recognized across migration research. However, this research demonstrates the need for a comprehensive understanding of and recognition of climate factors as important drivers of migration, especially as climate change increases the intensity and frequency of the driving events. Climate migration is an important influence on migration that deserves greater space in discussions of migration policy more generally.

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