



# Assessing causes and implications of climate-induced migration in Kenya and Ethiopia

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## ARTICLE INFO

### Keywords:

Climate change  
Ethiopia  
Kenya  
Gender  
Migration  
COVID-19

## ABSTRACT

Climate-induced migration is an increasingly pressing issue in many African regions, as rising temperatures and extreme weather events have caused the displacement of vulnerable populations. This is especially so in Eastern Africa and the Horn of Africa, particularly Kenya and Ethiopia, where extreme weather events have led to rangeland degradation, crop failures, water shortages, and food insecurity. Hence, there is a perceived need to understand these processes better. Against this background, this paper reports on a study investigating the processes associated with climate-induced migration in Kenya and Ethiopia. The research method used consisted of an expert-driven assessment approach, which assesses the causes of climate-induced migration in Kenya and Ethiopia and its human and social implications on local communities. Data were collected from 110 experts residing and working on climate and migration-related issues in Ethiopia and Kenya via e-mail, whose knowledge of the current situation has enabled the identification of some important trends. The results show that climate change is a primary trigger of migration both internally and externally. The high number of migrants, many of whom living within levels of poverty in their home areas is straining resources and services in the receiving regions. Their presence is also leading to increased competition for jobs and resources. Additionally, it has increased urban poverty, as many migrants have little access to living space and health care. This paper provides a welcome addition to the literature in that it lists the causes and implications of climate-induced migration and, by doing so, fosters a better understanding of the current crisis and its implications. The implications of this paper to the overall knowledge of climate change and migration are twofold. First, it highlights the need for governments, international organisations, and other stakeholders better to understand the complex linkages between climate change and migration. Secondly, it shows the usefulness of better recognising how climate change can drive migration and the other factors shaping the decision to migrate. The paper concludes by stating the urgent need for policies and programmes that support climate change-induced migrants. Also, it draws attention to the usefulness of promoting sustainable development in their origin countries and destinations, so that migration is not necessarily perceived as the only response to climate change. A further conclusion is that there is a perceived need for providing access to resources such as education, health care, and livelihood opportunities and establishing mechanisms to ensure a safe and dignified return for those who choose to do so.

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## 1. Introduction: climate change in Eastern Africa

Climate change is known for its far-reaching adverse effects on Earth and the well-being of people globally. It mainly impacts the poorest groups, especially in developing countries (Alexander et al., 2013), due to their low adaptive capacity to respond appropriately (Dell et al., 2012; IPCC, 2014, 2022) and their rather relatively high degree of vulnerability, and food insecurity (Birkmann et al., 2022; Yared et al., 2022). Among the impacts of climate change, sea-level rise, increases in the frequency of extreme events (high heat-wave, forest fire), vector-borne diseases, and loss of biodiversity across the globe are being observed (Ayal and Leal Filho, 2017; IPCC, 2014; Scheffran and Battaglini, 2011). In addition, East African countries such as Ethiopia and Kenya, have experienced recurring climate extremes and associated risks such as floods, droughts, heat stress, and infrastructural and physical damages (Abebe, 2014; Mueller et al., 2020; Niang et al., 2008; World Wide Fund for Nature, 2006). These phenomena, in turn, trigger various environmental, economic, social, political, and cultural problems and are related to migration (Abebe, 2014; Alhamshry et al., 2020; Conway et al., 2004; IPCC, 2014, 2022; Mueller et al., 2020; Owain and Maslin, 2018; Serdeczny et al., 2017).

In East Africa, climate change has also put pressure on the social security system and has sometimes aggravated unrest (Fortmann, 2010; Hallegatte, 2016; World Wide Fund for Nature, 2006), reversing poverty reduction efforts (IFPRI and UNDP, 2019). These elements have been leading to a forced displacement of residents from their permanent locations, searching for better livelihood options elsewhere (Connell, 2016; Warner et al., 2010). In addition, vulnerable groups of the community, such as children, women, and older people, are significantly affected by climate change. For them, migration is only sometimes possible since it requires physical (personal ability, capacity, and health) and financial capital (Birkmann et al., 2022; Bryan et al., 2009; Cherotich et al., 2012). Table 1 summarises some literature on climate change impacts in the studied countries.

Previous studies have shed light on various climate-related factors in Africa in general and in eastern Africa, particularly in Ethiopia and Kenya (Birkmann et al., 2022; Bryan et al., 2009; Cherotich et al., 2012; Conway et al., 2004; Ringle et al., 2010). However, to the authors' knowledge, there have yet to be any known studies in East Africa, especially in Ethiopia and Kenya, regarding the causes of climate-induced migration and its implications. Therefore, this paper aims to assess the impact of climate-induced migration and its implications in East Africa, using the experiences from Ethiopia and Kenya. In this study hydrometeorological (drought, flood, heat extremes, etc.) induced seasonal and permanent movement of people (displacement and migrations) were considered as migration.

## 2. Climate change and migration in Kenya and Ethiopia

Climate-induced migration has become a central topic in the international security debate. Policymakers and NGOs have expressed concerns that climate change will lead to armed conflicts and displacement rates on an unprecedented scale (IOM, 2014). Despite this trend, and widespread consent on the connections between climate change and migration, the rhetoric used in public discourse often runs ahead of existing empirical evidence. The projected number of people displaced by climate change by 2050 ranges between 25 million to 1 billion (IOM, 2014). Reliable figures are challenging to produce due to uncertainty about future climate change scenarios and to what extent current mitigation measures may contain them.

Furthermore, there is a disagreement over the definitions of climate-induced migration. Most importantly, migration is a multi-causal and multidimensional phenomenon. Environmental reasons are rarely a single driver of mobility but interplay with various socio-economic and political reasons. Moreover, climate change is commonly understood as a so-called threat multiplier – exacerbating pre-existing vulnerabilities such as poverty, including transient poverty, health issues, eroding cultural values, and communal tensions and violence (Adamu, 2012;

**Table 1**  
Climate change, extremes, and impacts in Sub-Saharan Africa focused on Kenya and Ethiopia.

Climate Change, Extremes, and Impacts	Country/ Region	References
Decrease in forest area	Kenya / Ethiopia	Abebe (2014), Debebe et al. (2023), Mueller et al. (2020), Niang et al. (2008), Rotich and Ojwang (2021)
Climate change and extremes are reversing poverty reduction efforts	Eastern Africa	Hallegatte (2016), IFPRI and UNDP (2019), World Wide Fund for Nature (2006)
The spatiotemporal situation of climate change and extremes has become unpredictable.	The Horn of Africa	Conway et al. (2004), Niang et al. (2008), Leal Filho et al. (2020a)
Climate change and extremes		
Climate change and extremes cause poverty, and food insecurity and lead to forced migration.	Ethiopia	IFPRI and UNDP (2019)
Climate change and extremes erode adaptive capacity and cause maladaptation responses.	Kenya/ Ethiopia	Birkmann et al. (2022)
<b>Rainfall, drought, and floods</b>		
Increased flash floods	Kenya	Development Initiatives Kenya (2019)
High-intensity floods		
Landslide/ Mudslide	Kenya	Ministry of Foreign Affairs (2018)
Altered runoff and hydrological cycles have intensified the magnitude of floods and droughts, creating a vicious circle of poverty and food insecurity leading to inadequate climate change responses such as selling off assets.	Kenya/ Ethiopia	Abebaw (2022), Abebe (2014), Birkmann et al. (2022), Chen et al. (2006), Fikru et al. (2021), Hartmann (2010), IPCC (2014), Jankowska et al. (2012), Mueller et al. (2020), Niang et al. (2008), World Wide Fund for Nature (2006)
Decreased rainfall, and increased evaporation	Ethiopia	Fikru et al. (2021)
Rainfall in the arid zones will likely decrease.	Kenya	WBG Climate Change Knowledge Portal (2020)
Extreme rainfall will likely increase in frequency, duration, and intensity.	Kenya	World Bank (2018)
Infrastructural and physical damages	Kenya, Ethiopia	Government of Kenya (2018a), IPCC (2007), Trisos et al. (2022)
<b>Temperature</b>		
Increasing annual mean trend by 1.0 °C, at an estimated average rate of 0.21 °C per decade.	Kenya	National Environment Management Authority (2015)
Projected to rise by 1.7 °C by the 2050 s and 3.5 °C at the end of the century.	Kenya	Ministry of Environment and Natural Resources (2016)
Increasing mean temperature of 1.7–2.1 °C by 2050	Ethiopia	IPCC (2007)
Increased frequency of drought spell	Ethiopia/ Kenya	IPCC (2014), Jankowska et al. (2012), Mueller et al. (2020), Trisos et al. (2022)
Increased heat stress	Kenya	Government of Kenya (2018a)

Byravan and Rajan, 2022; IOM, 2014; IPCC, 2014, 2022; Leal Filho et al., 2022a).

Central to the understanding of climate-induced migration is the concept of vulnerability. IPCC (2014) defines vulnerability as the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. Due to their high exposure to climatic risks, and heavy reliance on climate-sensitive sectors (e.g., rainfed agriculture, and relatively low adaptive capacities and high poverty), populations of Sub-Saharan Africa are amongst the most vulnerable to climate change risks (Adamu, 2012; IPCC, 2014, 2022; Trisos et al., 2022). Migration is the last adaptation option employed by a destitute segment of rural households in response to climate change and extremes. Indeed, regardless of its

socio-economic and cultural effects, migration is a means to generate remittances elsewhere and reduce consumption levels at the origin households (Birkmann et al., 2022; Gemenne and Blocher, 2017; Gray and Mueller, 2012; IOM, 2014; Nucera, 2023). Various factors, including social and economic capital, could influence an individual's decision to choose the destination site (Ayanlade et al., 2022; Vanwey, 2005). Birkmann et al. (2022) highlighted that climate change would likely complicate the livelihood system of vulnerable groups, exacerbating the humanitarian crises and increasing social trapping.

Although weather-related disasters have been a significant cause of migration in Ethiopia, it is rarely a single driver of migration. Related factors such as the loss of livelihood, hunger, conflict, and better employment prospects in cities are equally significant. The International Displacement Monitoring Centre (IDMC) notes that "the confluence of

**Table 2**

Summary of selected literature on climate change-induced migration in Kenya and Ethiopia.

Publications	Drivers	References
<b>Kenya</b>		
National Climate Change Action Plan 2013 – 2017; National Climate Change Action Plan (Kenya): 2018 – 2022	85 % of the land area is arid and semi-arid land (ASAL), supporting 30 % of the total population and 70 % of livestock production. Extreme and increasingly harsh weather and irregular and unpredictable rainfall, and droughts have become more frequent. Increasing heat waves, droughts, floods, and landslides have been identified by the National Climate Change Action Plan 2018 – 2022. The average temperature increased by 1 °C from 1960 to 2006, with extreme temperatures increasing to 2.1° in the Western regions.	Government of Kenya (2013, 2018a)
National Climate Change Action Plan 2013 – 2017; UNDP Climate Change Country Profiles Kenya	Rainfed agriculture accounts for 65 % of informal employment in rural areas, which renders the population highly vulnerable to extreme weather events. The country experienced acute food insecurity causing migration of 4.4 million people in 2022.	Government of Kenya (2013), McSweeney et al. (2012) Terry and Rai (2023)
Amid record drought and food insecurity, East Africa's protracted humanitarian crisis worsens	In the ASAL regions in 2022, 2.5 million heads of livestock were lost, with 10 million heads due to drought-induced shortage of pasture and water.	Mokku (2023)
Climate change destroys the livelihoods of Kenyan pastoralists. Sustainable Development Goals	Droughts, floods, livestock diseases, and armed conflicts were among the threats wiping out ASALs' livelihoods. Heavy droughts and flash floods in ASALs caused high displacement rates, mainly due to historic floods in May 2017 after the worst drought ever.	Government of Kenya (2018b)
Kenya: The 2018 Long Rains Season Assessment Report Africa	The number of people dependent on food assistance doubled to 2.7 million, and 3 million lacked access to clean water. With every new disaster, the vulnerability of local communities increases the risk of displacement continuously.	Hajžmanová (2018)
<b>Ethiopia</b>		
Drought analysis using Standardised Evapotranspiration and Aridity Index at Bilate Watershed: Sub-Basins of Ethiopian Rift Valley; Building Resilience to climate shocks in Ethiopia; The rain doesn't come on time anymore – poverty, vulnerability, and climate variability in Ethiopia	The climate is characterised by high variability, suffering historically from the recurrence and increasing severity of droughts. The high exposure to climatic shocks, high dependency on climate-sensitive economic and livelihood sectors, and low adaptive capacity lead to climate-induced migration. Erratic rainfall distribution and frequent droughts reduce water and pasture availability.	Bereket et al. (2022), IFPRI and UNDP (2019), Oxfam (2010)
Ethiopia; Building resilience to climate shocks in Ethiopia	The severe droughts in 2015/16 and 2020/21 pushed the near-poor temporarily below the poverty line and contributed to more persistent, chronic poverty and food insecurity. They also triggered internal displacement and migration, reaching 347,000 people newly displaced in 2016, compared to 104,000 people in 2015 and 49,000 in 2014.	IDMC (2017), IFPRI and UNDP (2019)
Ethiopia	Two hundred ninety-six thousand people were displaced due to violence and armed conflicts in 2016, significantly higher than in previous years. Following prolonged drought, clashes over resources between security forces and ethnic groups in the province of Oromia have intensified.	IDMC (2017)
Drought and population mobility in rural Ethiopia; A critical examination of rural out-migration studies in Ethiopia: considering impacts on agriculture in the sending communities	Rural people's movements have been linked to drought. Droughts are a push factor for migration, particularly for men searching for labour. Drought is positively correlated to long-distance and labor-related moves by men, mainly from landless households (more than doubled during periods of severe drought), and negatively correlated to marriage-related moves by women (mainly decreased during moderate drought). This could be because women's engagement in reproductive activities (family caring and management, domestic tasks) increased in bad times.	Gray and Mueller (2012), Dessalegn et al. (2023)

numerous drivers and triggers of migration is so complex that any attempt to distinguish between migration caused by conflict or other hazards is rendered pointless". The interaction of highly vulnerable rural populations, recurrent droughts, heavy rains, high levels of migration, ongoing armed conflicts, and weak government capacities create a vicious cycle perpetuating new migrations and displacement responses. Indeed, climate change multiplies pre-existing vulnerabilities such as poverty, food, and water insecurity and exacerbates armed conflicts. As a result, more than 5.6 million people needed emergency food assistance in 2017 (UNICEF, 2017). Table 2 summarises some literature on climate change-induced migration in the studied countries.

### 3. Methods

To assess the causes and characteristics of climate-related migration in Kenya and Ethiopia, the authors utilised an expert-driven assessment approach. Expert elicitation is a validated methodology utilised across many disciplines, including in the climate adaptation space (Berrang-Ford et al., 2020; Doria et al., 2009). Expert elicitation is especially useful in contexts where data may not be available or quickly gathered, and the potential for severe consequences is high (Hemming et al., 2018). Furthermore, expert elicitation provides the opportunity to analyse evidence across disciplines and, thus, synthesise various perspectives. The climate and migration nexus lacks data, poses significant threats to humanity, and spans disciplines, thus, positioning it well for such an approach.

Data were collected from 110 experts residing and working on climate and migration-related issues in Ethiopia and Kenya via e-mail. The targeted experts were researchers and practitioners working in humanitarian organisations, research institutions, and government agencies; hence, they were highly informed, worked as specialists in the field, or had extensive knowledge about specific aspects of climate and migration.

In terms of ethics, the selected experts were assured that the information they provided would be used for the purposes of the study only and that anonymity was provided. The paper, therefore, makes no references to issues such as the ages or gender of the respondents.

Several e-mail reminders were sent to encourage maximum participation, and participants were encouraged to share the survey with relevant colleagues. The survey questions elicit information regarding respondents' profiles, the determinant factors of migration and destination choice, the differences between men and women regarding migration, the degree of the country's preparedness to receive migrants, and the impact of the COVID-19 pandemic on migration. Replies to most questions were measured utilising a 5-point agreement or rating scale. The following questions were multiple choice based on the context of the question to analyse across responses:

- Perceived climate and allied migration pushing drivers (Responses: Drought; Flood; Erratic rainfall; Conflict; Chronic water scarcity; Shortage of pasture; Crop failure; Livestock diseases prevalence);
- Climate change-induced migration pulling factors (Responses: Water and pasture availability; Employment; Shelter and/or Security; Social Networks; Government decision; Climate or environmental factors; Social amenities (e.g., hospitals, schools); Cost of Living);
- Migrants' primary destination preference (Responses: Urban areas in the country of origin; Peri-urban areas in the country of origin; Rural areas in the country of origin; Urban areas in a neighbouring country; Others; Urban areas in a far-away country; Rural areas in a neighbouring country);
- Community segments most at climate risk to move (Responses: Low-income people; Ethnic minorities; Women);
- National policy solutions to address the negative impact of climate-driven migration (Responses: Supporting humanitarian action; Developing migration schemes; Supporting adaptation plans).

Previous research utilises consensus between 51 % and 80 % as the acceptable level (Hasson et al., 2000). The results gathered are presented in the next section.

## 4. Findings from the analysis and discussion

### 4.1. Descriptive statistics of the survey respondents and responses

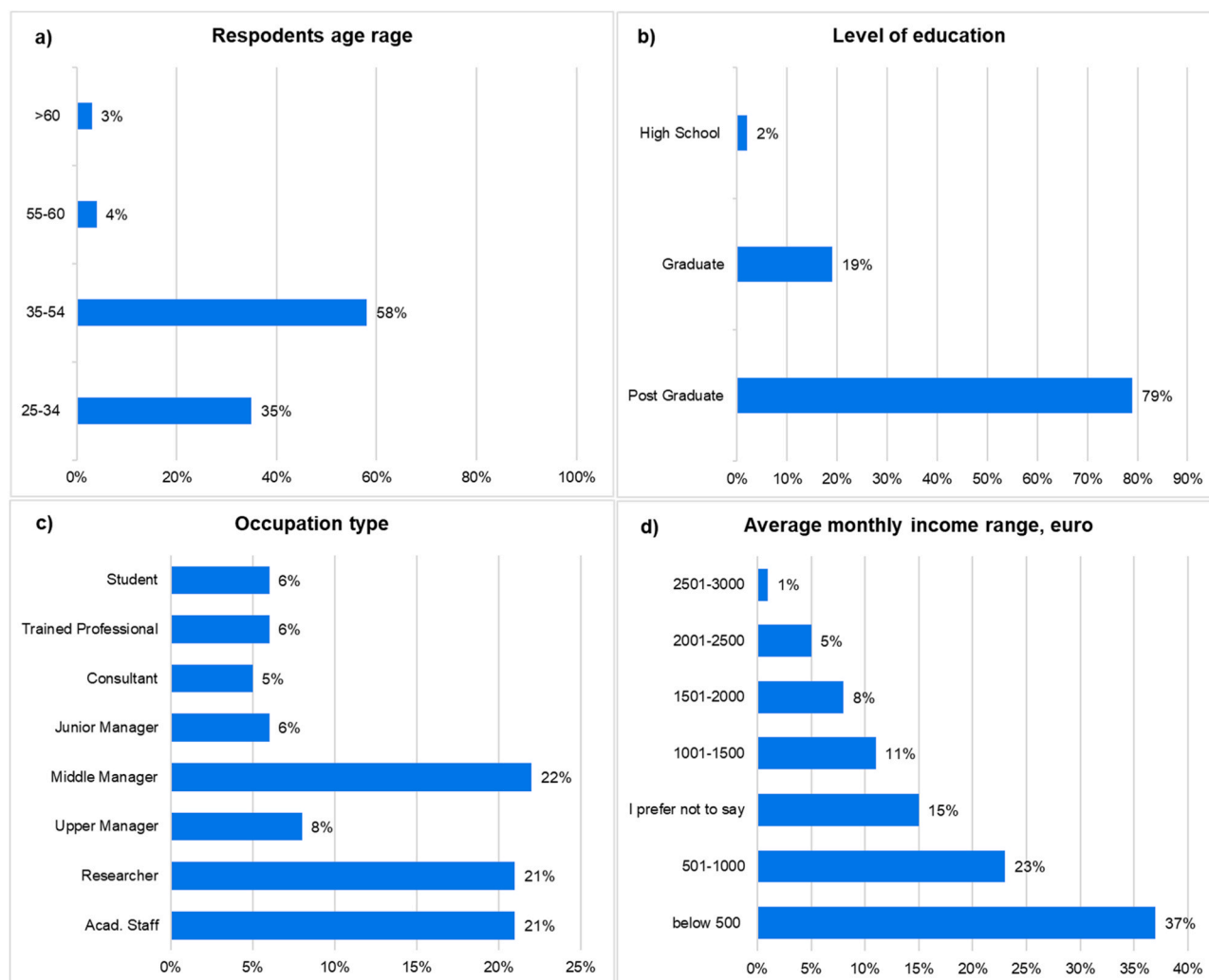
Of the 110 survey respondents, 74 represented Ethiopia and 36 from Kenya, with the prevailing age range of 58 % between 35 and 54 years old. The most common occupations were academic staff and researchers (21 %) and middle-level managers (22 %). Regarding the typical monthly household income, 60 % receive 1000 Euros or less, while 40 % declare an income greater than 1500 Euros per month (Fig. 1). There are significant income differences between Kenya and Ethiopia.

Although Africa has been the least affected continent by the COVID-19 pandemic (Bwire et al., 2022), 57 % and 6 % of the respondents were subjected to a partial and complete lockdown, respectively 37 % did not experience such a constraint. In addition to limited mobility, the reductions in the levels of economic activities are likely to lead to a greater vulnerability to food insecurity (Leal Filho et al., 2020b). The authors understand that it is likely that confinement has increased people's needs for food, and water and reduced subsistence agriculture production capacity, leading vulnerable people to food insecurity. Although little is known about the relationship between COVID-19 and climate change in migration, the authors realise that when acting in synergies, they can trigger a large-scale migration process due to the need for food and resources.

The survey respondents indicated droughts (90 %), conflicts (75 %), flooding (68 %), crop failure (63 %), shortage of pasture (58 %), and chronic water scarcity (56 %) among the main climatic and socio-environmental drivers of migration (Fig. 2). About 78 % felt climate-induced migration was a severe problem in Ethiopia and Kenya, while 4 % perceived it as not a priority issue in both countries. Among the socio-cultural factors, they named a need to search for employment (76 %), shelter and security (65 %), water and pasture availability (63 %), and cost of living (53 %). Most often, migrants choose urban centres (83 %), peri-urban areas (54 %), and other rural areas in their own country (38 %), as well as urban areas in a foreign country (45 %) as their primary destinations. This could be due to the availability of job opportunities for migrants in the construction and other sectors.

93 % of respondents felt that pastoralists were at risk of migrating due to climate change, followed by agro-pastoralists (89 %), farmers (79 %), and urban residents (45 %). Nearly 60 % of livestock in Kenya is found in ASALs, which have fragile ecosystems (Government of Kenya GoK, 2010). For instance, in pastoralist Wajir County, the increased drought frequency led the Kenya Government to declare the drought a national disaster in 2010–2011, 2016–2017, and 2021–2022 (Reliefweb, 2022). Despite farmers being rated very high risk, their livelihood, mainly agriculture, makes it challenging to migrate, forcing them to adapt to their farming systems (Dixon et al., 2001). The southern part of Ethiopia has been affected by the worst drought in the last 40 years due to four consecutive failed rainy seasons since 2020. It caused massive livestock deaths and a collapse of the flow of income and hence, acute food insecurity and destitution of pastoralists.

For urban residents, climate-related migration mainly directed at slum dwellers who live along river banks or areas prone to landslides and populated areas with unstable structures (UN-Habitat, 2021), for which migration is a matter of survival. The consulted experts agree that climate change poses high to very high risks to agro-pastoralists, pastoralists, and farmers, coinciding with findings in the literature that those who subsist off the land are more vulnerable to climate change than those with alternative livelihoods (Donatti et al., 2019; Harvey et al., 2014; Thorlakson and Neufeldt, 2012). Nevertheless, exposure is not equally shared. Less than half of experts agreed that urban residents were at risk, meaning that they assume a greater exposure to be seen



**Fig. 1.** Socio-demographic characteristics of the survey respondents: a) Respondents' age range; b) Level of education; c) Occupation type; d) Average monthly income range, euro.

among rural communities and that this exposure is a catalyst for migration from rural areas to urban ones. This may be related to a trend of in-country circular migration. A study in West Africa showed that these trends are actual (Leal Filho et al., 2022b), pointing out a need for scholars to examine other climate migration trends in urban settings, which have an intricate relationship with in-flows from rural regions, the provision of social services, and various political and economic conditions.

Fig. 3 synthesises the participants' prevailing observations on climate change victims' willingness to migrate and national readiness and policies to receive and provide the relevant humanitarian provision. Accordingly, 42 % and 34 % of respondents reported that climate change-induced migrants faced low and high risks at the destination site, respectively. In comparison, 11 % of respondents agree that migrants faced a very high level of risk at the destination site. Still, about 13 % of respondents could not judge the level of risks that climate change migrants could face in the destination sites. The risk exposure level of climate change-induced migrants could vary due to site suitability and the host community risk-sharing experiences and readiness of the stakeholders to receive and provide the required services. Besides, the availability of the nature and opportunities of jobs to migrants could contribute to the risk level of migrants.

Only 28 % of respondents felt their country is prepared to receive migrants, and 64 % observed a need for a more national government and stockholder preparation to receive and provide service to climate

change-induced migration. Ayal (2020) reported that limited resources are the bottleneck to implementing pre-disaster risk management measures (e.g., preparedness, prevention, and mitigation) in the studied region.

Regarding the nature of victims' migration, the share of voluntary and forced moves to a new site is one-third and two-thirds, respectively, reaffirming that migration is the victims' worst and last option. The motivation of migrants to the new site could be attributed to the risks attached to the destination sites. The most vulnerable segments of the community to climate-induced migration were low-income (60 %), ethnic minorities (48 %), women (46 %), older (33 %), and youth (10 %) people. Policymakers often view climate change adaptation measures and sustainable development in the larger sense as a means to reduce migration pressures, particularly for rural and hazard-exposed populations. At the same time, scholars believe that migration is part of the positive adaptation strategy adopted in the context of environmental and climatic change (Luetz, 2019; Nucera, 2023). It can be a way to reduce population pressures in places prone to climate risks. At the same time, diasporas provide essential resources to help communities adapt and respond to climate change through economic and social remittances (Gemenne and Blocher, 2017). The migration pattern in Kenya and Ethiopia was viewed as an adaptation strategy to enable income diversification during food scarcity and the destruction of assets such as livestock (Hoffmann et al., 2022), which explains mainly why low-income persons migrate. However, studies in Ethiopia showed a



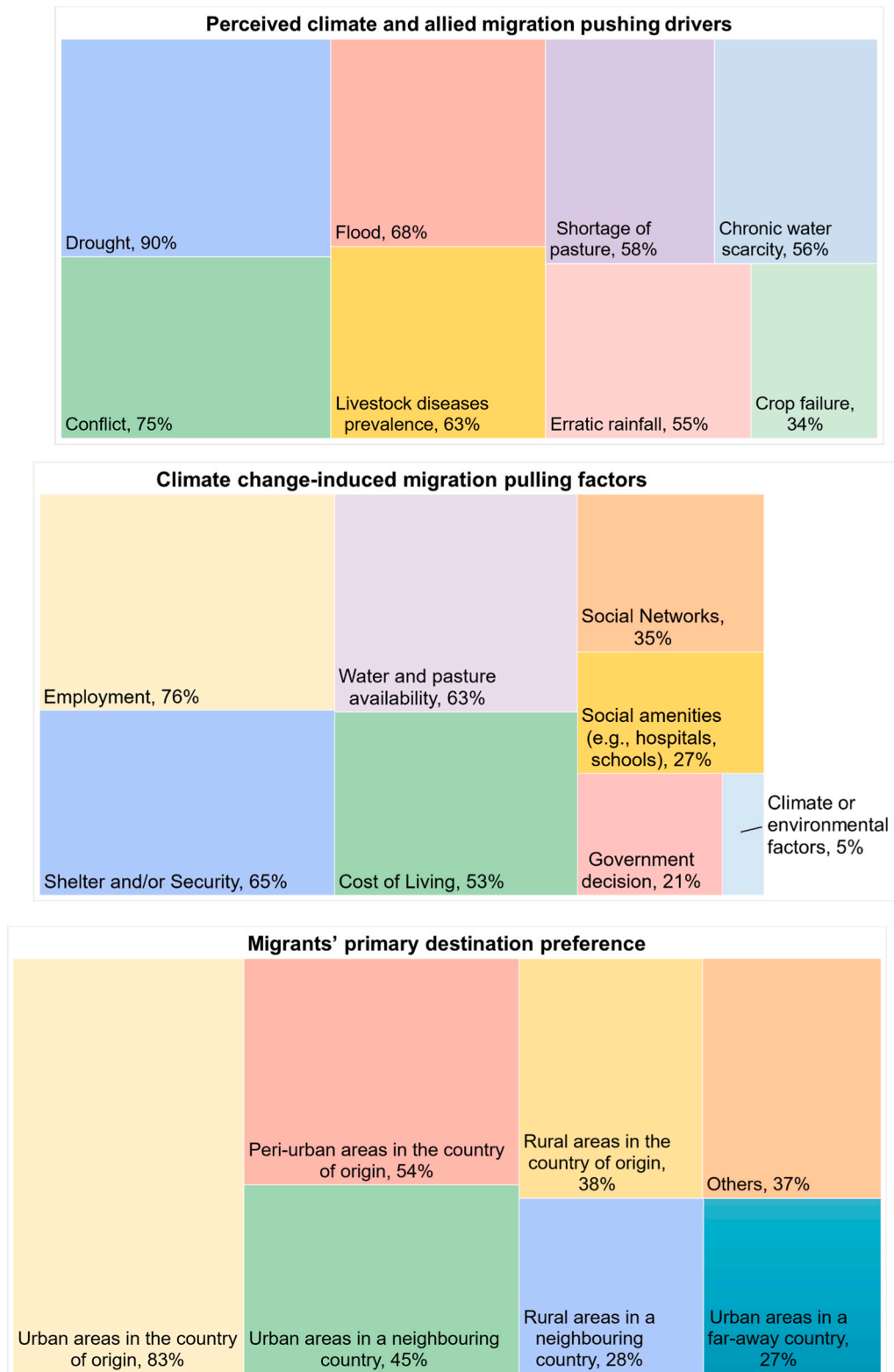


Fig. 2. Some of the factors influencing climate-induced migration.

different trend, with a higher percentage of the youth, especially the unmarried, relocating due to crop failure and family shocks (Kefelegn, 2020). Socio-economic and political factors, including high poverty rates, low levels of education and institutional capacities, and limited access to productive resources, significantly reduce smallholders' adaptation capacity to respond to climate change impacts and lead to

migration from rural to urban areas (Mercandalli et al., 2019). The migration of agricultural workers in search of new jobs is considered an adaptation strategy due to minimised employment opportunities in the farming sector (Nawrotzki et al., 2015).

As for the policy solutions, the most cited response was "supporting humanitarian action" (55 %), followed by circular labour migration

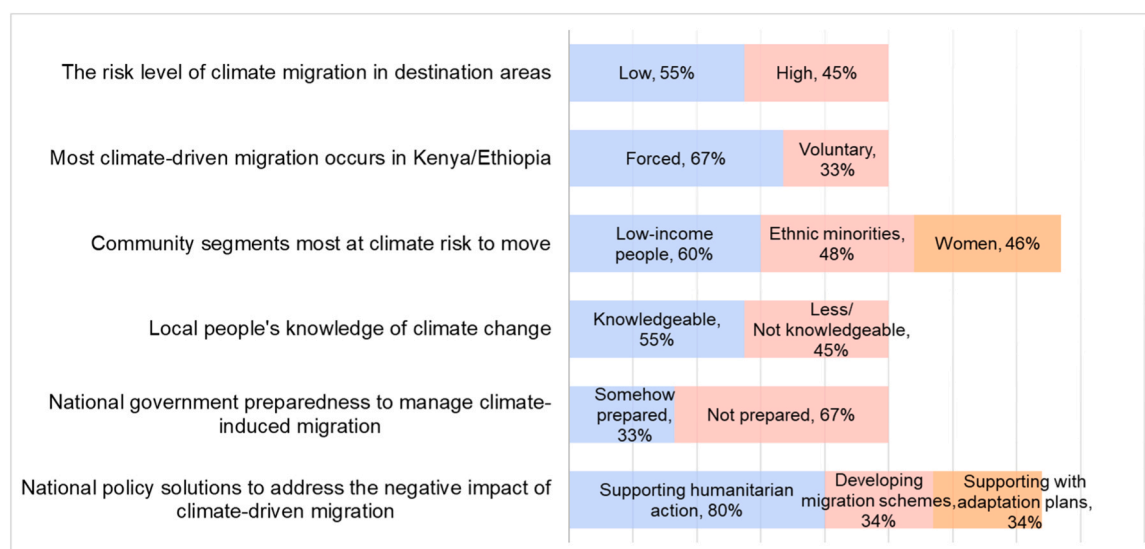


Fig. 3. Respondents' observations of climate change-induced migrants' risk, willingness to migrate, vulnerable groups, and local community perceptions of climate change.

schemes (34 %), supporting locals with adaptation plans (34 %), and bolstering humanitarian action (25 %). Finally, concerning the local people's perceptions of climate change, 23 % of the respondents acknowledged that local people have good knowledge about climate change, against 44 % who claim that people have only common knowledge.

Several authors (e.g., Kalungu and Leal Filho, 2016; Leal Filho et al., 2017; Lee et al., 2015; Saroar, Routray, 2010) observed that perception and awareness of climate change are influenced by age, gender, education, marital status, and the geographical location of the participant. More educated and aged people are more aware of climate change. Unfortunately, awareness of climate change is required by the community to be able to participate in adaptation and mitigation measures.

Fig. 4 synthesises the survey respondents' opinions regarding gender differences in the impacts and responses to climate-induced migration in Kenya and Ethiopia and how COVID-19 impacted these countries' preparedness and abilities to handle climate migration. The aggregate

response of the two countries shows that 60 % and 20 % of respondents indicated that men seek to migrate due to the impact of climate change and vice-versa. In contrast, 19 % of the respondents failed to decide about the gender difference in seeking climate-related migration.

Further, the survey analysis shows variations at the country level. For instance, about 57 % of Ethiopian respondents indicated that men seek to migrate more than women; 23 % reported that women seek to migrate more than men, and 19 % could not decide about the gender differences in seeking climate-induced migration. On the other hand, respondents in Kenya observed that women seek to migrate more than men in response to the impact of climate change. The decision to migrate among men and women variation in the two countries could be attributed to the differences in the availability of income generation options and socio-cultural influences.

Besides, about 39 % and 40 % of the respondents agreed and disagreed regarding the similarity of causes for men and women climate change-induced migration. However, key informants underlined that

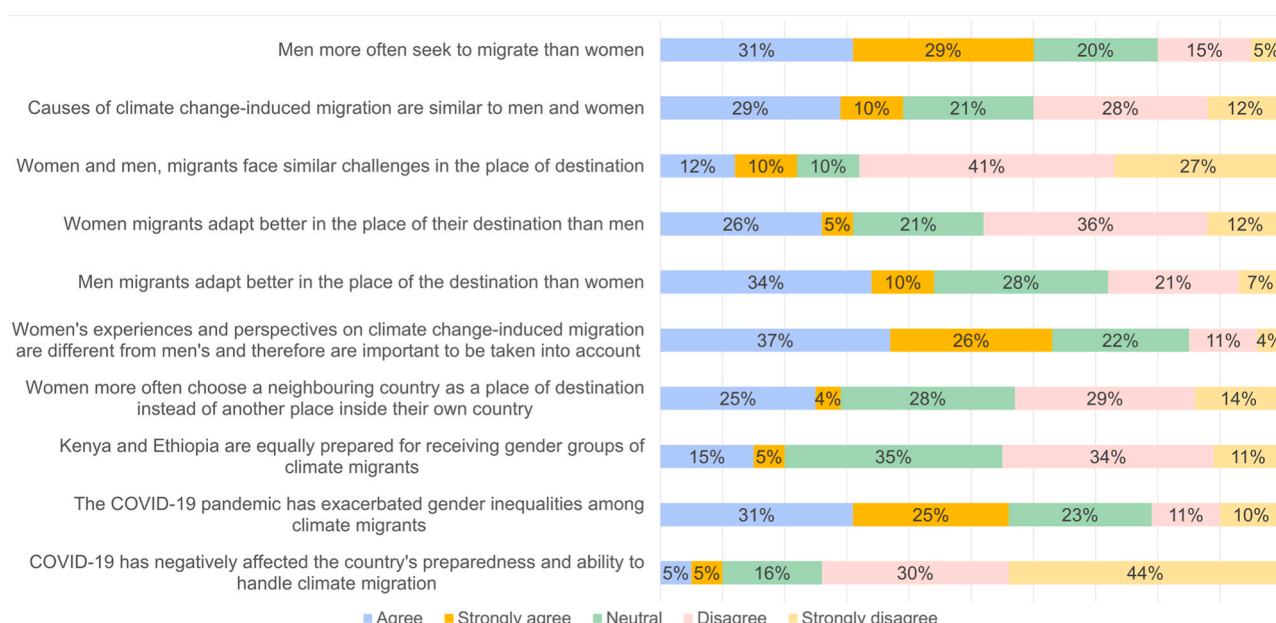


Fig. 4. Perceived similarity of causes, impacts, and challenges among climate-induced men and women migrants.

migration is the last option for individuals to respond to climate-induced (e.g., drought, flood) food insecurity. They further reported that climate stressors affected people who migrated temporarily to support their families and restock their assets. However, destitute households could permanently migrate to the nearby urban centre for a job. Also, most respondents (63 %) indicated that women's experiences and perspectives on climate-induced migration differ from men's and therefore are essential to consider.

Furthermore, a majority (68 %) observed that men and women climate-induced migrants faced different challenges. Key informants also support this result as they indicated that initially, women faced more severe challenges than men due to socio-cultural influences and physical weakness to engage in labour demanding jobs. Moreover, once the men reached the destination sites and secured livelihood income, they could adapt faster than women. Most respondents (57 %) indicated that women prefer sites within a country to the neighbouring country as a destination. Concerning the ability of their countries to handle migration, about 38 % of respondents were confident that their country was ready to receive migrants; nonetheless, 34 % felt the absence of readiness to provide humanitarian needs to them. Still, 28 % could not decide about their country's capacity to provide adequate humanitarian services to climate victims.

The survey result shows that 41 % of respondents from Ethiopia reported the absence of readiness to receive climate change-induced migrants.

On the contrary, 28 % and 51 % of Ethiopian and Kenyan respondents indicated their country's readiness to receive climate-induced migrants. Nevertheless, 31 % and 24 % could not judge their country's capacity to accommodate these migrants. The country-level variation regarding the perceived readiness to handle migration seems attributable to their experience and complications related to receiving refugees. For instance, Ethiopia hosts and provides humanitarian aid to refugees from various countries.

Regarding the COVID-19 pandemic effects, close to 84 % of respondents said it has negatively affected the two countries' preparedness and abilities to handle climate-induced migration. In addition, about 75 % of respondents felt the adverse impact of COVID-19 on human security, livelihoods, and policy priorities. As a result, the national government had to shift budgets allocated to development and other humanitarian intervention improvements to COVID-19 risk management. In a nutshell, COVID-19 measures and climate adaptations are parallel 'Low probability – High Consequences' emergencies competing for limited resources. [Mohammad and Pugacheva \(2022\)](#) reported that 16 major economies globally have shown that the experience gained from the pandemic increased concern about the impacts of climate change.

The COVID-19 pandemic has adversely impacted the countries' ability to handle and prepare for climate migration. The pandemic led to severe economic and social disruptions ([Laborde et al., 2020](#)), exacerbating the underlying climate change impacts and compromising the achievement of SDGs #1 (No poverty), # 2 (Zero Hunger), #3 (Good Health and Well-being), #5 (Gender equality), and # 10 (Reduced inequalities), affecting more women and girls. More than 60 % of the African people, including Ethiopia and Kenya, faced a complete loss or reduction in their incomes due to COVID-19, deepening already high poverty rates. Furthermore, the pandemic has exacerbated inequalities between women and men in different socio-economic groups ([UFPA, 2021](#)).

Moreover, there will likely be significant compounding effects because of the meager vaccination rates in Kenya and Ethiopia. Firstly, countries will likely be unable to turn their political attention to climate-related impacts shortly. Secondly, the social and economic impacts of the pandemic are likely to exacerbate those caused by climate change and extremes, which could significantly increase rates of migration or trap populations.

## 5. Conclusions

In terms of **contextualisation**, the work undertaken as part of the paper has outlined some current trends related to climate change and migration in Ethiopia and Kenya as examples of trends in Eastern Africa. There is a perceived need for research into trends related to migration in that region since it has been increasing in recent years, driven by various factors such as conflict, drought, poverty, and economic opportunities. Migration also significantly affects the region's social, economic, and political dynamics. Therefore, research into trends related to migration in eastern Africa, such as the one reported in this study, helps to provide meaningful insights that could inform policies and strategies for managing migration and understanding the root causes of migration and its impacts on communities in the region.

The **methods** used in this study on trends related to migration in eastern Africa, namely expert-driven assessments, helped foster a more comprehensive understanding of the complex and dynamic nature of migration in the region. The approach used assisted the researchers in gaining a deeper understanding of the motivations and drivers of migration, as well as the structural and social factors that contribute to it. Furthermore, it enabled the researchers to understand better the geographic patterns of migration in the investigated countries.

In terms of its **results**, this study showed that climate change is a significant driver for migration and adds to various socio-economic pressures the populations of these countries already face. Also, the elicitations performed among 110 experts who have taken part in the survey have identified that droughts, conflicts, and crop failures are key factors influencing the decision to migrate. Besides, male migration is more prominent than female one.

In addition, the limited access to productive resources significantly reduces smallholders' adaptation capacity to respond to climate change impacts and leads to migration from rural to urban areas. Moreover, the lockdowns associated with the COVID-19 pandemic did cause some distress among local populations but did not lead to significant migration movements.

This paper has some **limitations**. First, it looked at trends in a set of two countries. Secondly, the set of 110 experts may be considered a small sample.

Despite these constraints, the paper provides a welcome addition to the literature since it sheds some light on some of the issues which characterise migration in Eastern Africa, such as limited government support for climate change adaptation strategies, weak governance systems which do not take the specific needs of rural population into account, and the limits seen in respect of the availability of options for income generation. These are elements that trigger the decision to migrate. Some of the means to address the problem of climate-driven migration may include:

- greater recognition of the seriousness of migration as a problem associated with various aspects of the climate crisis, which needs to be handled by national governments and international institutions through suitable policies;
- since the problem is here to stay, new flexible and migration pathways should be designed that respect human rights, especially labour rights, and with easier access to permanent residence and citizenship;
- the scope and scale of climate change and environmental impacts need to be better integrated into development aid programmes, to reduce the pressures and the need for climate-driven migration.

The **implications** of this paper to the overall knowledge of climate change and migration are twofold. First, it highlights the need for governments, international organisations, and other stakeholders better to understand the complex linkages between climate change and migration. This includes better recognising how climate change can drive migration and the other factors shaping the decision to migrate. Second,



the paper emphasises the importance of developing policies and programmes that support migrants, including those displaced by climate change, and promote sustainable development in countries of origin and destination. This includes providing access to resources such as education, health care, and labour opportunities and establishing mechanisms to ensure a safe and dignified return for those who choose to do so.

In terms of **prospects**, much research is needed on the dynamics of climate change and migration, so as to better understand the socio-economic elements that drive it in the context of a changing climate.

Overall, action on migration associated with climate change needs to go hand in hand with commitments to address the climate crisis, contributing to climate-related finance for mitigation, adaptation, and loss and damage. This action is necessary for the health and viability of the entire planet because it will address the structural factors underlying migration decisions.

As this paper has demonstrated, the implications of climate-induced migration in Kenya and Ethiopia are far-reaching. In addition to the displacement of individuals and families, there is an increasing risk of conflict between ethnic groups over resources and services. This is especially true in areas where there has already been a history of ethnic tensions. The competition for resources and services can lead to increased violence and decreased access to food, water, and shelter. Correspondingly, **with respect of future trends**, it is imperative to address these root causes of migration in the region and examine the role of climate change in exacerbating existing conflicts in Eastern African countries. Also, there is a need for further studies investigating migration trends driven by climate change, the impacts of climate change on rural livelihoods, assessments of the relationships between climate change, migration, and health outcomes, examinations of the socio-economic and environmental factors that drive migration in the region in response to climate change, and investigations on the effectiveness of current climate change adaptation strategies in the region, identifying approaches to improve them. A further area that merits research is the effects of climate change-induced migration on gender dynamics in Eastern African societies. Finally, the critical role played by international organisations in promoting sustainable development strategies to address climate change and migration in Eastern African countries should be better investigated, producing effective strategies to enhance the effectiveness of their work.

#### CRedit authorship contribution statement

**Walter Leal Filho:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Desalegn Y. Ayal:** Investigation, Data curation, Data Collection, Visualization, Writing – original draft, Writing – review & editing. **Desalegn Dawit Chamma:** Investigation, Data Collection, Writing – original draft. **Marina Kovaleva:** Investigation, Data curation, Visualization, Writing – original draft, Writing – review & editing. **Gabriela Nagle Alverio:** Investigation, Data curation, Methodology, Writing – original draft. **Daniel M. Nzengya:** Investigation, Data Collection, Writing – original draft. **Serafino Afonso Rui Mucova:** Investigation, Data Collection, Data curation, Writing – original draft. **Jokastah Kalungu:** Investigation, Methodology, Data Collection, Writing – original draft, Writing – review & editing. **Gustavo J. Nagy:** Investigation, Data curation, Visualization, Writing – original draft, Writing – review & editing.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

Data will be made available on request.

#### Acknowledgements

This paper is part of the “100 papers to accelerate climate change mitigation and adaptation” initiative led by the International Climate Change Information and Research Programme (ICCIIRP).

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