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Climate change in agricultural production and migration intentions in developing countries: Evidence from African countries

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ABSTRACT
This study aims to assess the effect of climate change on agricultural production and its impact on migration intentions. We conceptualize migration intention as a process ranging from desire and planning to preparation. Using data from round 7 (2016/2017) of Afrobarometer surveys, we estimate a sequential logit model on a sample of 44,224 adults in 33 African countries. Descriptive results show that 36% of adults express a desire to migrate, 14% plan to leave within two years, and only 3% are preparing to migrate. Econometric estimates indicate that worsening climatic conditions in agricultural production increase the likelihood of migration intentions. The study also identifies several factors affecting migration intentions, such as age (with younger individuals more likely to migrate), gender (women show lower migration intentions), education level, internet usage, and dependency on remittances. Additionally, political commitment and perceptions of governance play a role. The findings emphasize the importance of incorporating climate change into public policies, particularly migration policies. The study recommends focusing on improving living conditions for the younger, more educated population, those dissatisfied with governance, and those dependent on remittances, to better address migration challenges linked to climate change.

Contribution/Originality: This study conceptualizes migration intention as a process from desire to preparation, addressing gaps in the empirical literature using data from 33 African countries. It highlights how perceptions of agricultural production deterioration can be a key factor in understanding the impact of climate change on potential African migration.

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1. INTRODUCTION
Irreversible migration patterns across continents are being driven by climate change and its effects on a global scale (International Organization for Migration, 2019). Migration is an important livelihood and adaptation strategy in the context of changing climatic and environmental conditions. It offers the opportunity to diversify incomes, reduce vulnerability, and increase the resilience of rural households (Black et al., 2011; Foresight, 2011; Gemenne & Blocher,

2017). It is estimated that around 143 million new climate-induced migrants from sub-Saharan Africa (SSA), Latin America, and South Asia will be registered by 2050 (Rigaud et al., 2018).

In addition, with increasing floods, droughts, high temperatures, and variable rainfall, SSA is expected to bring more than 85 million (4 percent of its total population) new climate-induced migrants (Rigaud et al., 2018). This will result in migration pressures due to low agricultural yields and water scarcity. Climate change threats are already manifesting themselves in many African countries, affecting the livelihoods of communities, particularly those that depend on climate data, such as agriculture. Poor harvests, loss of livestock, and changes in the way of life of indigenous communities are just some of the manifestations of climate change in various countries (Milán-García et al., 2021).

Over the last three decades, the role of climate change in driving human migration has attracted a growing interest (Azumah, Mahama, Yegbemey, & Dapilah, 2022; De Longueville, Zhu, & Henry, 2019). Studies have shown that climate change is a factor driving migration, particularly for vulnerable groups (Gray & Wise, 2016; Hermans & McLeman, 2021; Hoffmann et al., 2020; McLeman et al., 2021). For Kaczan and Orgill-Meyer (2020), climate-induced migration is not only prevalent among poor households but also among long-distance national migrants in drought conditions. While economic factors are considered to be the main drivers of migration, the underlying factors influencing migration are both economic and non-economic. However, in addition to ethnic, political, and economic reasons, recent research shows that climate change is gradually becoming a key factor driving migration (Kudjey, 2014; Milán-García et al., 2021).

Although several studies have analyzed migration factors in the literature, few have focused on the intention to migrate (Diallo, 2022; Migali & Scipioni, 2019). However, the intention to leave the country is an important step in the migration process and can be influenced by several factors. To our knowledge, no study has investigated the link between perceptions of climate change on agricultural production and migration intentions. Moreover, the few studies that have looked at the intention to migrate have been limited to examining the desire, planning, or preparation for migration separately (Diallo, 2022; Docquier, Peri, & Ruyssen, 2014; Migali & Scipioni, 2019; Van Mol et al., 2018). The intention to migrate can be seen as a process that combines the three phases: from the desire to migrate, through planning, to preparation.

The objective of this study is to evaluate the effect of climate change on agricultural production and the intention to migrate. Using Round 7 of the Afrobarometer surveys, we modeled the process of intention to migrate using a sequential logistic model on a sample of 44,224 people in 33 African countries. The descriptive results show that 36% of adults express a desire to migrate; 14% have planned to leave in the next two years, and only 3% are preparing to migrate. Econometric estimates show that the perception of climate degradation in agricultural production has a significant impact on Africans' intention to migrate, in terms of both desire and planning.

The rest of the document is structured as follows: Section 2 presents the literature review; Section 3 explains the methodology and data sources. Section 4 provides the results of econometric estimations. Section 5 concludes the paper with policy implications.

2. LITERATURE REVIEW

The relationship between intentions to migrate and climate change, particularly in the context of agriculture, is an increasingly studied topic in the social and environmental sciences. This literature review examines the factors influencing climate change-related migration, with a particular focus on agriculture.

2.1. Climate Change as a Factor in Migration

Climate change, in particular its impact on natural resources such as water, soil, and agricultural yields, is increasingly recognized as a major driver of international and internal migration. According to several studies, extreme climatic events (droughts, floods, heatwaves) directly affect the food security and livelihoods of agricultural populations, driving them to migrate.

Research by Black et al. (2011) argues that extreme climatic conditions (storms, prolonged droughts, heat waves) lead to direct pressure on farming systems, prompting farmers to seek better opportunities elsewhere. This migration can be temporary, but it can also become permanent when climatic conditions make farmland unviable in the long term.

2.2. Intentions to Migrate in Response to Climate Change

The question of intentions to migrate in response to climate change is the subject of much research. These intentions are often modulated by a complex set of economic, social, political and environmental factors. Climate change is therefore not a direct cause of migration, but rather one factor among others that increases the pressure on already vulnerable communities. Bohra-Mishra, Oppenheimer, Cai, Feng, and Licker (2014) found that migration intentions in rural South Asia were strongly influenced by climate variability, but also by socio-economic factors such as poverty, access to land and government policies on agricultural aid. Climate change is exacerbating the economic vulnerability of farmers and smallholders in particular, prompting them to consider migration as an adaptation strategy.

2.3. Agriculture and Climate Impacts

Climate impacts on agriculture vary from region to region, but some effects are common to many agricultural zones. Prolonged drought, changes in rainfall patterns, and rising temperatures reduce crop yields and the availability of water resources. Arid and semi-arid zones, particularly in sub-Saharan Africa and South Asia, are especially vulnerable. Hugo (2011) points out that agriculture, being one of the most vulnerable sectors to climate change, often becomes a breaking point for farmers who do not have the means to adapt. Reductions in agricultural productivity lead to a loss of income, forcing farmers to seek alternatives for survival, such as migration.

2.4. Public Policy Response

Public policies play a key role in managing climate change-related migration. Several studies have shown that climate change adaptation strategies can mitigate migration needs, but they are often not sufficient on their own. Work by Foresight (2011) suggests that agricultural policies incorporating climate change resilience strategies (such as improved farming techniques, sustainable water management, or diversification of income sources) could reduce migration intentions. However, implementing such policies requires significant investment and a commitment from local and international governments to support vulnerable populations.

3. METHODOLOGY

3.1. Data Source

The data used in this study comes from round 7 of Afrobarometer surveys conducted in 34 countries between 2016 and 2017. Afrobarometer is a pan-African, non-partisan survey research network that has been producing reliable data on Africans' experiences and perceptions of democracy, governance, quality of life, and related issues since 1999. In each country, Afrobarometer works with a national partner to collect the data.

Interviews were conducted face-to-face in the respondents' language with nationally representative samples. Sample sizes vary between 1,200 and 2,400, depending on the country. The selection of respondents is based on a stratified random sample drawn in two stages. In the first stage, primary units are selected with probability proportional to population size (PPPS). In each primary unit, a fixed number of eight adults are selected. Samples of this size provide results with a margin of error at the 95% confidence level of +/-2.8 and 2.0 percentage points, respectively, for the 12,000 and 2,400 sample sizes. The Round 7 surveys covered 34 countries. However, we have excluded Kenya from our analysis because questions on the intention to migrate were not collected. In total, our study covered a sample of 44,224 individuals. Table 1 lists the countries included in our study and the size of the corresponding sample.

Table 1. Country and sample.

Country	Sample size	Country	Sample size	Country	Sample size
Benin	1200	Lesotho	1200	São Tomé and Príncipe	1200
Botswana	1198	Liberia	1200	Senegal	1200
Burkina Faso	1200	Madagascar	1200	Sierra Leone	1200
Cabo Verde	1200	Malawi	1200	South Africa	1840
Cameroon	1202	Mali	1200	Sudan	1200
Côte d'Ivoire	1200	Mauritius	1200	Tanzania	2400
eSwatini	1200	Morocco	1200	Togo	1200
Gabon	1199	Mozambique	2392	Tunisia	1199
Gambia	1200	Namibia	1200	Uganda	1200
Ghana	2400	Niger	1200	Zambia	1200
Guinea	1194	Nigeria	1600	Zimbabwe	1200

Source: Author's calculations from data Afrobarometer round 7.

3.2. Study Variables

3.2.1. Dependent Variable: Migration Intention

To measure the intention to migrate, we first use the question: To what extent, if at all, have you thought about emigrating to another country to live there? with the modalities "Not at all", "A little", "Somewhat", or "A lot". In fact, those who expressed a desire to migrate were asked a second question: To what extent have you planned or prepared to emigrate to another country to live there? The terms of this last question are coded as follows: "You have no such plans at present"; "You are planning to emigrate in a year or two, but have not started to prepare to do so"; "You are in the process of preparing to migrate and are currently following the procedures for obtaining a visa." The combination of these two variables reveals three stages in the intention to migrate: First the desire, then the planning, and finally the preparation.

3.2.2. Variable of Interest

This variable measures the perception of climate change in agricultural production in the respondent's locality. This variable is coded "1" if the respondent considers that climatic conditions in his or her locality have become worse and "0" if they have not.

3.2.3. Control Variables

The list and description of the control variables are provided in Table 2.

Table 2. Description of control variables and expected sign.

Variables	Description	Expected sign.
Gender	1. Female and 0. male	+/-
Age	1. 18-35 years; 2. 36-55 years; 3. Over 55	-
Level of education	0. No formal education; 1. Primary; 2. Secondary; 3. Post-secondary	+
Residential area	1. Rural; 0. Urban	-
Dependence on migrant remittances	0. Not at all; 1. A little bit; 2. Somewhat 3. A lot	+
Returning migrants in the household	1. Yes; 0. No	+
Internet exposure	1. Every day/A few times a week; 0. Otherwise	+/-
Elections participation	1. Yes; 0. No	+/-
Current orientation of the country	1. Wrong direction; 2. Right direction	+/-
Government performance in job creation	1. Very badly/Fairly Badly; 0. Otherwise	+
Functioning of democracy	1. Quite satisfied/Very satisfied; 0. Otherwise	-
Corruption	1. Increased a lot/Increased somewhat; 0. Otherwise	+

Source: Author's calculations from data Afrobarometer round 7.

3.3. Theoretical Framework of the Sequential Logit Model

In this paper, we focus on the intention to migrate of African adults. This intention is apprehended through a sequential process in three phases: the desire to migrate, planning, and preparation. The dependent variable, 'intention to migrate', is a polytomous variable with three ordered modalities, where 0 indicates that the respondent has no desire to leave at all; 1 means that the adult has the desire to leave but is not planning his or her trip; 2 corresponds to adults who wish to migrate, having planned to leave in the next two years, but who are not yet preparing to do so; and 3 identifies individuals who actually intend to migrate. The conventional approach would be to apply the ordered logistic regression model (Agresti, 2010), the purpose of which is to estimate the probability that "migration intention" is equal to 0, 1, 2, or 3 among the individuals in the population. However, these decisions are not only ordered but also sequential, as the attainment of a modality "l" is conditional on the attainment of the preceding modalities. Moreover, there is also an aspect of self-selection for each stage in that only those who wish to migrate will plan the journey, and only some of them are in the process of preparing to make the migration a reality. Thus, the estimates of the ordered logistic model would be biased because they do not take into account the self-selection effects included in the model (Lillard & Willis, 1994; Long & Freese, 2014). Consequently, the econometric model adapted for this study is the sequential logit model widely used in the literature (Diallo & Ndiaye, 2022; Fall, Ky, & Birba, 2015; Sato, Takano, & Miyashiro, 2017). Figure 1 shows that of the 44,224 individuals, 15,866 (36%) expressed a desire to migrate, of whom 6,119 (14%) had planned to migrate, and 1,442 (3%) were preparing to migrate.

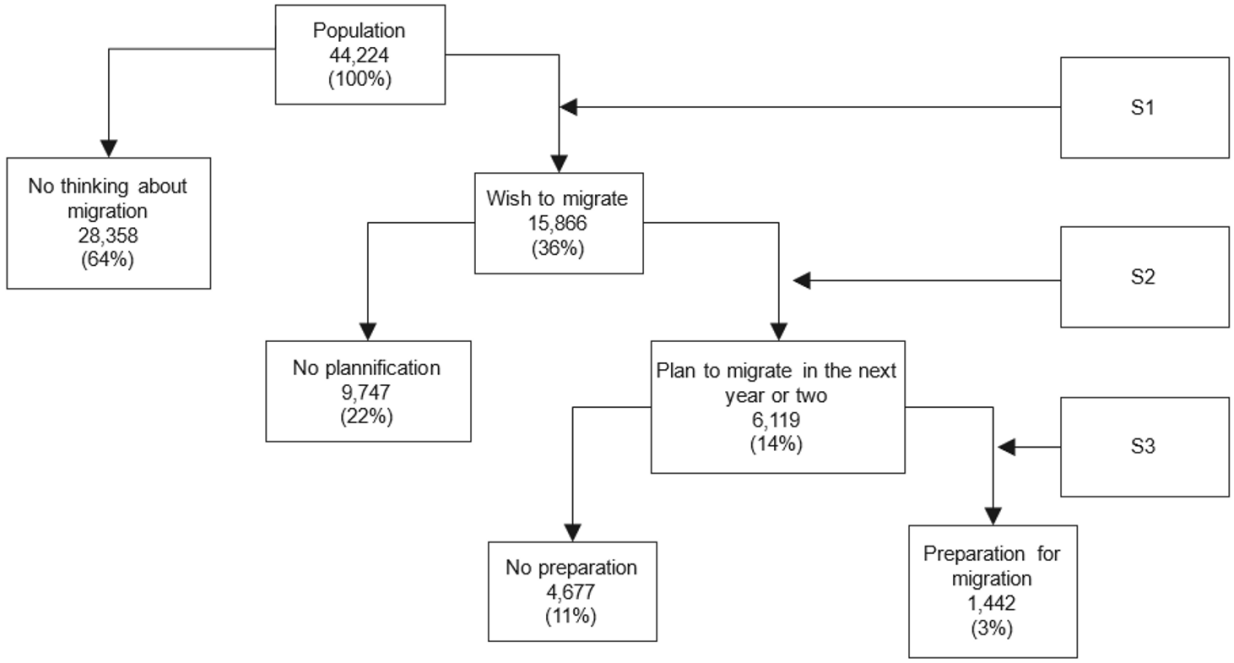

Figure 1. Process of migration intention.

Note: Inspired from Diallo and Ndiaye (2022).
Source: Author's constructions from data, Afrobarometer round 7.

Figure 1 shows two levels of transition, described as follows: (i) whether or not the individual wishes to migrate ($S = 1$); (ii) Having a desire, the individual decides whether or not to plan to migrate in the next two years ($S = 2$); (iii) Knowing that they have planned to migrate, individuals decide whether or not to prepare for migration ($S = 3$).

This means that the probability of p_{ki} for an individual i to stop at a level k, is given by the following logistic function.

$$p_{ki} = F_k(x_i\beta) = \frac{exp\ (\alpha_k + \sum_m \beta_{km} x_m)}{1 + exp\ (\alpha_k + \sum_m \beta_{km} x_m)}\ if\ p_{k-1,i} = 1$$

Where $p_{k-1,i}$ indicates whether or not individual i completed the previous transition. The probability for each transition is modelled as a function of m characteristics such as, gender, age, education level, residential area, etc. In the sequential logit model, the probability of individual i moving from one transition k to another is given by.

$$P(y_i = k) = \begin{cases} F_1(x_i\beta) & for\ k = 1 \\ \prod_{j=1}^{k-1}\left[(1 - F_j(x_i\beta)F_k(x_i\beta)\right] & if\ k \geq 2 \end{cases}$$

Where y_i represents the polytomous variable and the event $y_i = k$ means that the individual stops at the k^{th} transition. The model parameters were estimated using the SEQLOGIT command in Stata 16.

4. RESULTS AND DISCUSSION

4.1. Migration Aspirations, Reasons and Desired Destinations

Overall, analysis of Figure 2 shows that 36% of adults express a desire to move elsewhere to live; 14% have planned to leave in the next two years, and only 3% are preparing to migrate. The desire to migrate is greatest among people living in Central African countries (47%), followed by West Africa (41%) and North Africa (40%). The desire to migrate is lowest among residents of South Africa (30%) and East Africa (22%). The same trend is observed for planning and preparation.

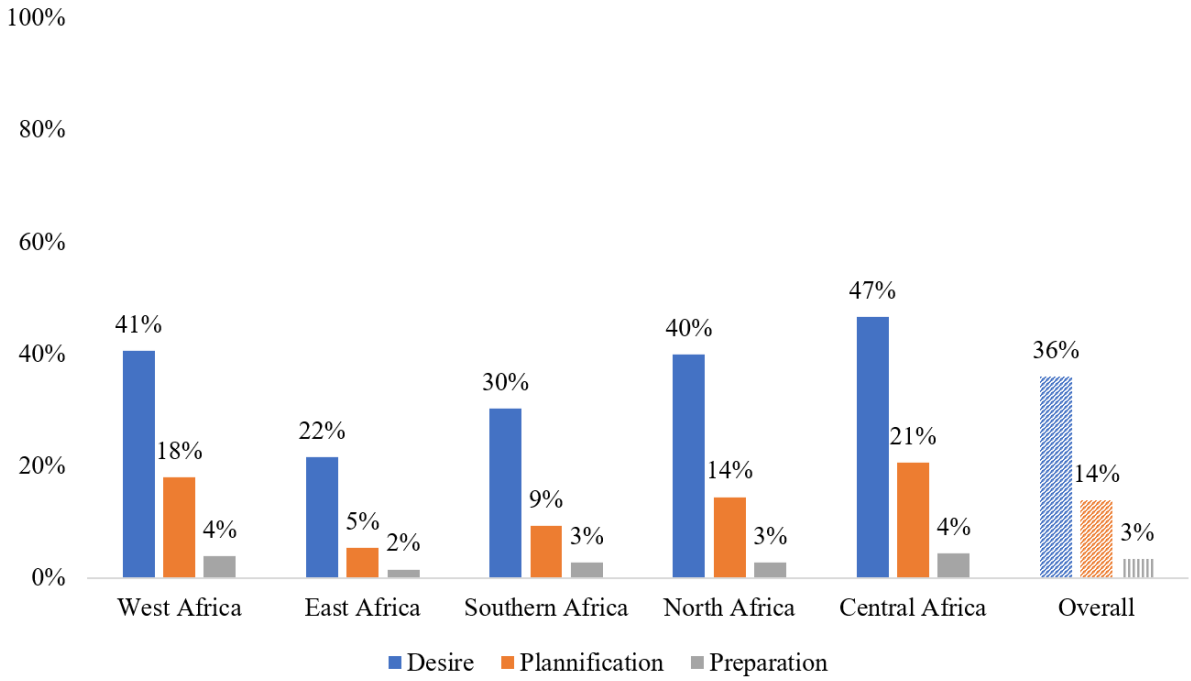

Figure 2. Migration intentions by regional area.

Source: Author's calculations from data Afrobarometer round 7.

Table 3 shows that the main reasons why potential migrants intend to migrate are to seek better job opportunities (44%), to escape economic hardship and/or poverty (30%) and to continue their studies (6%). Table 4 indicates the destination of migration. In fact, their preferred destination is Africa (36%), followed by Europe (27%) and North America (23%). However, disaggregated analysis reveals that the extent of the reasons for intending to migrate differs from one region to another (Tables 5 and 6). For example, the search for better job opportunities is cited by the majority (51%) in South African countries, compared with 36% in Central Africa. Escape from poverty is mentioned more in West Africa (35%) and North Africa (32%). The pursuit of studies is mentioned more in Central Africa (11%), while the search for better business opportunities is more important in East Africa (11%). The desired destinations vary greatly between regions (Table 5). In Central Africa (41%), East Africa (48%) and Southern Africa (60%), Africa remains the main desired destination. In North Africa (48%), Europe is the preferred destination for potential migrants. Finally, in West Africa, potential migrants are more interested in going to North America (32%), Europe (31%) and Africa (25%).

Table 3. Reasons for migration intention.

Reasons for migration intention	Male	Female	Urban	Rural	Total
Find work/ Better job/ Better work oppo	47%	39%	43%	44%	44%
Economic hardship/Poverty	28%	31%	26%	33%	30%
Better business prospects	4%	4%	4%	4%	4%
Better politic environment	4%	3%	4%	3%	4%
Better school/Medical services	2%	3%	2%	2%	2%
To pursue an education	6%	6%	8%	4%	6%
To join spouse/ Family members	1%	3%	2%	3%	2%
Travel/tourism/Adventure/Experience	4%	6%	5%	4%	5%
Don't know/Refused	2%	2%	2%	1%	2%
Others	2%	3%	2%	2%	2%
Total	100%	100%	100%	100%	100%

Source: Author's calculations from data Afrobarometer round 7.

Table 4. Destination desired by potentials migrants.

Destination desired	Male	Female	Urban	Rural	Total
Africa	37%	35%	47%	36%	36%
Europe	28%	27%	22%	27%	27%
North America	22%	24%	19%	23%	23%
Central/South America	3%	3%	3%	3%	3%
Middle East/Asia	2%	2%	2%	2%	2%
Australia	3%	3%	2%	3%	3%
Other countries outside Africa	3%	4%	3%	3%	3%
Don't know/Refused	2%	3%	3%	3%	3%
Total	100%	100%	100%	100%	100%

Source: Author's calculations from data Afrobarometer round 7.

Table 5. Reasons for migration intention.

Reasons for migration intention	West Africa	East Africa	Southern Africa	North Africa	Central Africa	Total
Find work/ Better job/ Better work oppo	41%	45%	51%	42%	36%	44%
Economic hardship/Poverty	35%	23%	23%	32%	23%	30%
Better business prospects	4%	11%	4%	4%	4%	4%
Better politic environment	2%	4%	4%	5%	6%	4%
Better school/Medical services	2%	1%	3%	1%	3%	2%
To pursue an education	7%	2%	4%	5%	11%	6%
To join spouse/ Family members	3%	0%	2%	1%	2%	2%
Travel/tourism/adventure/Experience	4%	10%	4%	3%	9%	5%
Don't know/Refused	1%	1%	2%	4%	3%	2%
Others	1%	2%	3%	3%	4%	2%
Total	100%	100%	100%	100%	100%	100%

Source: Author's calculations from data Afrobarometer round 7.

Table 6. Destination desired by regional area.

Destination desired	West Africa	East Africa	Southern Africa	North Africa	Central Africa	Total
Africa	25%	48%	60%	8%	41%	36%
Europe	31%	14%	15%	48%	29%	27%
North America	32%	23%	13%	16%	19%	23%
Central/South America	2%	8%	1%	14%	1%	3%
Middle East/Asia	2%	3%	2%	3%	2%	2%
Australia	3%	1%	4%	4%	1%	3%
Other country outside Africa	3%	3%	3%	3%	5%	3%
Don't know/Refused	2%	1%	3%	3%	3%	3%
Total	100%	100%	100%	100%	100%	100%

Source: Author's calculations from data Afrobarometer round 7.

4.2. Descriptive Statistics for the Variables Used

According to the survey (Table 7), just over a third of the population (35.9%) expresses the desire to migrate, while 13.8% are in the planning stage and 3.3% are in the process of preparing to migrate. However, disparities are observed in terms of desire, planning, and preparation to migrate, depending on perceptions of climate change, socio-

demographic characteristics, perceptions of governance, political participation, and civic engagement, as well as experiences of migration within the household and access to social networks.

People with a poor perception of climate change have a greater desire to migrate (36.9% compared to 35% among those who do not have a negative perception of climate change), plan more (14.6% compared to 13.1%), and prepare more for migration (3.4% compared to 3.2%).

With regard to socio-demographic characteristics, the results show that men express more desire (39.6%), planning (16.3%), and preparation (4.0%) to migrate than women (32.2%, 11.4%, 2.5%, respectively). The desire, planning, and preparation to migrate increase with the level of education: for example, people with a higher level of education express more desire (36.9%), planning (14.6%), and preparation (3.4%) to migrate than uneducated people (23.7%, 9.9%, 2.1%). Furthermore, age is a factor that is negatively correlated with the desire, planning, and preparation to migrate; i.e., the older a person gets, the less their intention to migrate decreases. Young people aged between 18 and 35 express a greater desire (43.7%), plan (17.8%), and preparation (4.1%) to migrate than adults (36-55) and older people (over 55). City dwellers expressed more desire (42.5%), planning (17.0%), and preparation (4.0%) to migrate than rural dwellers (30.4%, 11.3%, 2.6%, respectively).

People with a negative perception of the country's current governance expressed a greater desire to migrate (38.7% compared to 32.4% for those with a positive perception of the country's governance), planned more (15.3% compared to 12.0%), and prepared more for migration (3.6% compared to 2.9%). The increase in the level of corruption is also a factor that leads people to express a greater desire (38.6%), more planning (15.1%), and more preparation for migration (3.5%) than those who feel that the level of corruption has not increased (32.9%, 12.5%, 3.0% respectively). Finally, the government's poor performance in terms of job creation also contributes more to desire (37.3%), planning (14.6%), and readiness to migrate (3.5%) than a positive opinion of the government's performance in terms of employment (32.4%, 11.9%, and 2.8% respectively).

Household dependence on remittances increases the desire, planning, and preparation to migrate. The larger the amount of remittances, the more people express a desire to migrate (49.1% compared to 33.1% in households that have received no remittances), plan more (26.2% compared to 11.6%), and prepare more for migration (7.9% compared to 2.5%). Furthermore, in households where a migrant lives, the desire to emigrate (55.5%), planning (26.3%), and preparation for migration (7.0%) are higher than in households without returning migrants (29.4%, 9.7%, and 2.0% respectively).

Internet use and access to social networks and the media appear to be a determining factor in people's intention to migrate. People who use the internet express more desire (51.3%), planning (22.5%) and preparation (5.8%) to migrate than those who do not use the internet (30.4%, 10.8%, 2.4% respectively).

Finally, the intention to migrate varies according to political participation and civic engagement. People who did not take part in the presidential elections expressed a greater desire to migrate (41.6%), planned more (17.7%), and prepared more (4.3%) than those who did take part in the elections (33.1%, 12.0%, 2.8%, respectively). We also see that people who are dissatisfied with the level of democracy express a greater desire to migrate (39.8%), plan more (16.1%), and prepare more (3.8%) than those with a positive perception of democracy.

Table 7. Descriptive statistics.

Variables	N	%	Desire	Planification	Preparation
Gender					
Male	22080	49.9	39.6	16.3	4.0
Female	22144	50.1	32.2	11.4	2.5
Age					
18-35 years	24174	54.7	43.7	17.8	4.1
36-55 years	14071	31.8	30.4	10.6	2.6
55 years and over	5979	13.5	17.0	5.4	1.3
Education					
No formal education	9081	20.5	23.7	9.9	2.1
Primary	12311	27.8	28.6	9.6	2.2
Secondary	16322	36.9	42.2	15.8	3.7
Post-secondary	6510	14.7	50.6	22.3	5.9
Residential area					
Urban	19938	45.1	42.5	17.0	4.0
Rural	24286	54.9	30.4	11.3	2.6
Climate change perception					
Not worse	23279	52.6	35.0	13.1	3.2
Worse	20945	47.4	36.9	14.6	3.4
Current orientation of the country					
Right direction	19979	45.2	32.4	12.0	2.9
Wrong direction	24245	54.8	38.7	15.3	3.6

Table 7. Descriptive statistics (Continued).

Variables	N	%	Desire	Planification	Preparation
Corruption					
Not increased	21223	48.0	32.9	12.5	3.0
Increased a lot/Increased somewhat	23001	52.0	38.6	15.1	3.5
Government performance in job creation					
Not bad	12638	28.6	32.4	11.9	2.8
Very badly/Fairly badly	31586	71.4	37.3	14.6	3.5
Dependence on migrant remittances					
Not receive	34700	78.5	33.1	11.6	2.5
A little bit	4623	10.5	43.8	19.3	5.1
Somewhat	3208	7.3	46.9	23.4	6.1
A lot	1693	3.8	49.1	26.2	7.9
Returning migrant in the household					
No	33210	75.1	29.4	9.7	2.0
yes	11014	24.9	55.5	26.3	7.0
Internet exposure					
No	32598	73.7	30.4	10.8	2.4
yes	11626	26.3	51.3	22.5	5.8
Elections participation					
No	14303	32.3	41.6	17.7	4.3
yes	29921	67.7	33.1	12.0	2.8
Functioning of democracy					
Not satisfied	24723	55.9	39.8	16.1	3.8
Quite satisfied/Very satisfied	19501	44.1	30.9	10.9	2.6

Source: Author's calculations from data Afrobarometer round 7.

4.3. Estimation Results

The results of the estimation of the sequential logit model are shown in Table 8. It appears that the desire to migrate is positively influenced by the perception of a deterioration in agricultural production due to climate change. People for whom climatic conditions in agricultural production have become worse are 20% (OR=1.20; CI=1.15 - 1.25, p<0.01) and 11% (OR=1.11; CI=1.04 - 1.19, p<0.01) more likely to want to migrate and to plan to migrate in the next two years. However, the effect of climate change on readiness to migrate was not significant. This result is understandable insofar as farmers in developing countries generally do not have the means to cope with the devastating effects of climate change, which is a source of low agricultural yields, drought, and so on. These farmers are keen to migrate, and may even be planning to do so without being prepared. This explains why the effect of climate change is not significant on the third level of the sequence. On the other hand, the search for the best opportunities for extreme climatic events (droughts, floods, heat waves) directly affects the food security and livelihoods of farming populations, driving them to migrate.

Other factors have been identified as having a significant influence on the various stages of the desire to migrate. These relate to socio-demographic characteristics, perceptions of governance, political participation, and civic engagement, as well as migration experience within the household and access to social networks. In terms of gender, women have a lower intention to migrate than men. They are 27% less likely to want to migrate. Knowing that they want to migrate, they are 25% less likely than men to plan their migration. When they do manage to plan, they are 15% less likely than men to prepare to make their migration a reality. In terms of age, adults and older people are less likely than younger people (aged 18-35) to want and plan to migrate. However, once their desire and planning are in place, older people are more likely to prepare to translate their intentions into actual migration. Education plays an important role in the desire to migrate. Individuals with a primary education are 24% more likely to want to migrate than those with no formal education. This figure rises to 59% for people with secondary education and 78% for adults with post-secondary education. On the other hand, educated people are less likely to plan their migration than the less educated. However, when the conditions of desire and planning are met, the more educated are more likely to make their migration a reality through preparation by regular means.

In terms of their perception of the country's governance, those who feel that my country is heading in the wrong direction are 16% and 7% respectively more likely to want to migrate and then plan to migrate. In addition, those who rate the government's job creation performance rather poorly and those who feel that the level of corruption in the country is on the rise are 7% more likely to want to migrate. The level of satisfaction with the functioning of democracy significantly affects the desire to migrate. Those who are satisfied with their country's democracy are respectively 29% and 15% less likely to want to migrate or to be planning to migrate in the near future.

The desire to migrate increases with the level of dependence on remittances. Those who depend little (25%), a little (41%), or a lot (49%) on remittances are more likely to want to migrate than those who do not depend on remittances at all. The same trend is observed in planning and preparation. On the other hand, the presence of a returning migrant in the household generates a strong desire to migrate. Residents with return migrants in their households are 2.7 times more likely to want to migrate. They are more willing to plan and prepare for migration abroad. Exposure to the media, in particular regular access to the internet, increases the desire to migrate. Those with access to the internet are 37%

more likely to want to migrate, 20% more likely to plan to migrate in the next two years, and 14% more likely to be preparing to migrate abroad. Finally, we note that political participation reduces the desire to migrate. Those who voted in the last national elections are 8% less likely to want to migrate and 16% less likely to be planning to migrate in the near future.

Table 8. Sequential model, odds ratio.

Variables	Desir, planification, preparation vs No desire	Planification, preparation vs desire	Preparation vs planification
Climate change (Worse)	1.20***	1.11***	0.94
	(1.15 - 1.25)	(1.04 - 1.19)	(0.83 - 1.06)
Gender (Female)	0.73***	0.75***	0.85**
	(0.70 - 0.76)	(0.70 - 0.80)	(0.75 - 0.96)
Age (Ref. 18-35 years)			
36-55 years	0.63***	0.80***	1.13*
	(0.60 - 0.66)	(0.74 - 0.87)	(0.98 - 1.31)
Over 55 years	0.30***	0.67***	1.12
	(0.28 - 0.32)	(0.58 - 0.77)	(0.85 - 1.48)
Education (Ref. No formal education)			
Primary	1.24***	0.72***	1.17
	(1.16 - 1.32)	(0.64 - 0.81)	(0.94 - 1.44)
Secondary	1.59***	0.72***	1.15
	(1.49 - 1.69)	(0.65 - 0.80)	(0.94 - 1.40)
Post-secondary	1.78***	0.84***	1.31**
	(1.64 - 1.93)	(0.74 - 0.95)	(1.05 - 1.64)
Residential area (Rural)	0.77***	0.94	1.06
	(0.74 - 0.81)	(0.88 - 1.01)	(0.93 - 1.21)
Current orientation of the country (Right direction)	1.16***	1.07**	1.00
	(1.11 - 1.21)	(1.00 - 1.15)	(0.87 - 1.13)
Corruption (Increased a lot/Increased somewhat)	1.07***	0.99	0.95
	(1.02 - 1.12)	(0.92 - 1.06)	(0.84 - 1.08)
Government performance in job creation (Very badly/Fairly badly)	1.07**	1.06	1.03
	(1.01 - 1.12)	(0.98 - 1.15)	(0.89 - 1.19)
Functioning of democracy (Quite satisfied/Very satisfied)	0.79***	0.85***	1.03
	(0.76 - 0.83)	(0.79 - 0.91)	(0.90 - 1.18)
Dependence on migrant remittances (Ref. Not receive)			
A little bit	1.25***	1.28***	1.19**
	(1.17 - 1.34)	(1.16 - 1.41)	(1.01 - 1.42)
Somewhat	1.41***	1.60***	1.20*
	(1.30 - 1.53)	(1.43 - 1.79)	(1.00 - 1.44)
A lot	1.49***	1.82***	1.44***
	(1.34 - 1.66)	(1.57 - 2.10)	(1.15 - 1.79)

Table 8. Sequential model, odds ratio (Continued).

Variables	Desir, planification, preparation vs no desire	Planification, preparation vs desire	Preparation vs planification
Returning migrant in the household (Yes)	2.72***	1.66***	1.31***
	(2.60 - 2.86)	(1.55 - 1.77)	(1.16 - 1.48)
Internet exposure	1.37***	1.20***	1.14*
	(1.30 - 1.45)	(1.11 - 1.30)	(0.99 - 1.31)
Election's participation	0.92***	0.84***	0.95
	(0.88 - 0.97)	(0.78 - 0.90)	(0.84 - 1.07)
Constant	0.43***	0.73***	0.22***
	(0.39 - 0.47)	(0.62 - 0.85)	(0.16 - 0.29)
Observations	44,224	44,224	44,224
Wald chi2	7129	7129	7129
Prob>chi2	0.000	0.000	0.000

Note: Confidence Interval in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Author's calculations from data Afrobarometer round 7.

Figure 3 shows that the perception of a deterioration in agricultural production due to climate change. On average, almost one African in two (47%) believes that climate change has made agricultural yields worse. This perception is

more pronounced in East Africa (63%) and West Africa (51%), and is relatively less important in South Africa (45%), Central Africa (37%) and North Africa (35%).

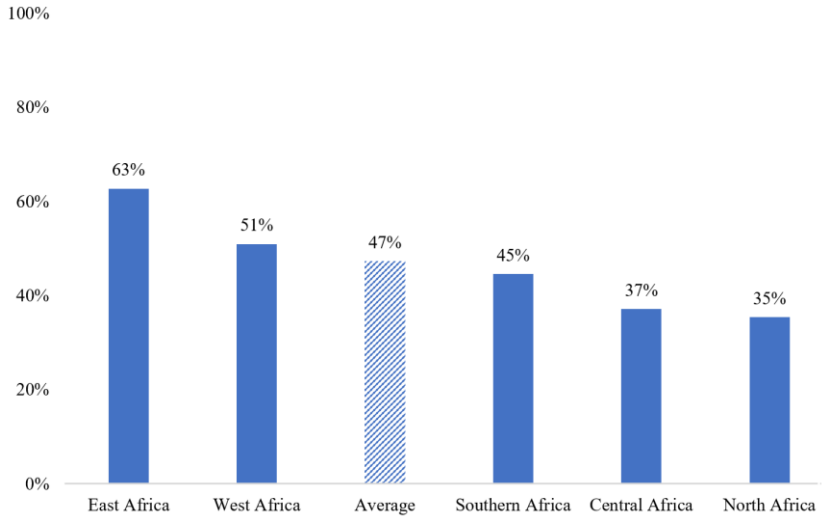

Figure 3. Perception of a deterioration in agricultural production due to climate change, by region.
Source: Author's constructions from data, Afrobarometer round 7.

The econometric results (Table 9) show that this perception of deteriorating agricultural production encourages people to want to migrate: West Africa (19%), South Africa (25%), and North Africa (34%). Those with negative perceptions of climate change are 62% more likely to plan to migrate in North Africa and 20% more likely in Central Africa. However, in West Africa, preparation for migration is negatively associated with the perception of a deterioration in production. The odds ratio, estimated at 0.77, means that people who consider that climate change has worsened agricultural production are 23% less likely to prepare to migrate.

Table 9. The effect of climate change perception on migration aspirations by region.

Zone	Desir, planification, preparation vs No desire	Planification, preparation vs desire	Preparation vs planification
West Africa	1.19***	1.03	0.77***
	(1.12 - 1.27)	(0.94 - 1.14)	(0.65 - 0.91)
East Africa	1.10	0.93	1.16
	(0.90 - 1.34)	(0.62 - 1.38)	(0.53 - 2.54)
Southern Africa	1.25***	1.09	1.13
	(1.16 - 1.35)	(0.95 - 1.24)	(0.89 - 1.44)
North Africa	1.34***	1.62***	1.00
	(1.14 - 1.57)	(1.28 - 2.05)	(0.62 - 1.61)
Central Africa	0.99	1.20*	1.23
	(0.86 - 1.15)	(0.98 - 1.48)	(0.84 - 1.78)

Note: Confidence interval in parentheses.
*** p<0.01, ** , * p<0.1.
Source: Author's calculations from data Afrobarometer round 7.

5. CONCLUSION

This study assessed the effect of the perception of climate change on agricultural production and its impact on Africans' desire to migrate. The descriptive results show that 36% of adults express a desire to move elsewhere to live; 14% have planned to leave in the next two years, and only 3% are preparing to migrate. Using a sequential approach to migration aspirations, the results of our estimates reveal that climate degradation significantly and positively affects Africans' desire and planning to migrate abroad. However, the effect on preparedness is not significant. In addition, we have identified several other factors that influence the aspiration to migrate. Women are less likely to aspire to migration. Young people desire and plan their migration more than their elders. However, older people are more inclined to be ready to migrate. While education increases the desire to migrate, it also shows that the better educated are less likely to plan their migration, even though they are more likely to actually go through with it. This study also highlights the role of good governance and government performance in the desire to migrate. Additionally, the household's migration experiences through dependence on remittances and the presence of a returning migrant significantly affect all stages of migration aspiration. Civic participation and exposure to the media also play an important role in aspiring to migrate. This study highlights the need to take greater account of climate change in public policies, and in particular in migration policies. Promoting good political, economic, and social governance, as well as civic engagement, could reduce the level of frustration in countries, and therefore reduce the high level of willingness to migrate. She suggests focusing on improving the living conditions of the population by targeting the youngest, the most educated, and those who are heavily dependent on remittances.

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