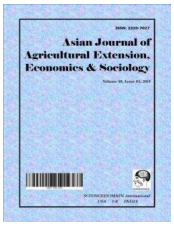

Asian Journal of Agricultural Extension, Economics & Sociology

31(3): 1-12, 2019; Article no.AJAEES.48239
ISSN: 2320-7027

Analyse the Perception Level and the Causes of Migration in Mali

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript

Article Information

DOI: 10.9734/AJAEES/2019/v31i330133
Editor(s):
(1) Dr. Kwong Fai Andrew Lo, Agronomy and Soil Science, Chinese Culture University, Taipei, Taiwan.
Reviewers:
(1) Fabiane Vinente Dos Santos, Instituto Leônidas e Maria Deane, Brazil.
(2) Teresa Cierco Gomes, University of Porto, Portugal.
Complete Peer review History: http://www.sdiarticle3.com/review-history/48239

Original Research Article

Received 22 December 2018
Accepted 28 March 2019
Published 08 April 2019

ABSTRACT

Subsistence farmers in Sahelian Africa are highly exposed to the environmental challenges associated with climate change. Temporary or Permanent emigration can offer to an individual or household the opportunity to cop against these special effects. One of the most important challenges to quantifying the impact of climate change on emigration in Mali is the lack of accurate temporal and spatial data. Emigration data must be adequately detailed to take in both long distances and short distances. The objective of this research was to identify the socioeconomic characteristics of migrants based on the push factors. For instance, to identify the characteristics of people who migrant due to bad weather or environmental challenges. From the result, the factors that significantly influenced migration were sex, age, and age squared, household size, labour constraint, and location. Multinomial logistic regression was used to analyze the subject.

Keywords: Migration drivers; multinomial logit; rural mali; environmental challenges.

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1. INTRODUCTION

Even if the movement is a fundamental part of human being, in fact, Mali has a long history of migration particularly emigration. Recently it has become an important transit place for migratory flows within the Sahelian region and beyond. The country is specific by its population involved in migration issue that linked to cultural practices in using migration as rite of passage for young men. Mali has been experiencing seasonal and circular migration as well as nomadic and pastoral movements. A vast country is Mali with an estimated population of 18 million (2016) using the 2009 general population household survey. Mali is a vulnerable country to international commodity price fluctuations as well as to the effects of current global issue climate change mostly because of an undiversified economy. With a high population growth rate among the poor countries in the world, plus droughts have severely induced more poverty, impacted food insecurity and instability. In addition, since the early of 2012, the political and the security situation in this country has been especially unstable. These conditions have imposed on the population to high displacement in this country.

Besides all those things, migration in Mali is not a new issue; it becomes a way of life. Historically, Malian are noted for frequent migration, especially the Soninké, for the purpose of searching opportunities abroad, such as leave their origin place for working elsewhere during the dry season. However, migration occurs in all regions of Mali. Referring to the two last general population and household survey the third region of Mali (Sikasso) represents a garret of emigrants. Nevertheless, this region by nature remains the finest region, in terms of receives the highest rainfall in the whole country, where agriculture is mostly promoter. Irregularity in the rainfall and the fall of the price of cotton destabilize the stay of the population. Therefore they use to choose one of the three strategies rural livelihoods, which is migration among agro-pastoral activities and livelihood diversification [1].

Recently research reveals that migration particularly emigration in Mali is the response of negative factors, for example, population growth, environmental change and especially increasing economic pressure that pushes people to move.

Out-migration might serve additional as a coping strategy from households to expand livelihoods and to support the feeding costs of some of their members [2,3]. So that in terms of unpredictable climate, lack of well-functioning credit market, subsistence farmers try to deal with these sad conditions by sending a household member abroad. In this study, we purpose to contribute to the growing body of researches focused on out-migration in the study site through an examination of the causes and the perceptions level of the out-migration in a rural area in south-eastern Mali.

The rest of this paper is structured as follow: Section 2 presents the migration trends in Mali followed by the methods in section 3. Section 4 and 5 describe respectively the results and discussion, and the conclusion.

2. MIGRATION TRENDS IN MALI

Mali, a landlocked Sahelian country in West Africa, has been experiencing migratory travels since the pre-colonial time. The phenomenon increased over the last decades due to climate change such as endemic drought, and/or floods, economic crisis, and political problems. In fact, in this West African Sahelian country, much of the population depends on subsistence and small-scale farming or livestock breeding and are thus extremely vulnerable to climatic change [4]. Mali has three major agricultural systems: irrigated rice, rain-fed food grains, and cotton production (cash crop). An important role is played by the livestock sector as farther north, pastoralists are more numerous and rain-fed agriculture becomes less worthwhile [1].

The patterns of migration in Mali showed that it exists three patterns of emigration: emigration through African frontiers (principally, Côte d'Ivoire, Ghana, Zaire, South Africa, and Gabon), emigration outside Africa (mostly, France, Spain and United States of America) and internal movements (mainly Bamako). Migration is very common in Mali, the Malian immigration or also called Malians Abroad is recognized with some development projects, which go beyond simple satisfaction of domestic needs. Kayes, the first region of Mali, is known as the most region affected by the phenomena of migration. The migrants of this region alone in France is between 80, 000 and 120, 000 people [5].

During November 1-5, in 1999, the First Ministerial meeting on Migration and Urbanization in West Africa took place in Bamako, Mali. Perhaps due to the high migration

in the country. Migration occurs in Mali since the pre-colonial time and its practices is both a transit point to get to North Africa and depart to the other continents such as Europe and Asia. Migration is so deeply ingrained in Malian's culture, therefore in certain regions; young people are not allowed to marry until they have gone abroad. The economic and political structure of French in West Africa during the colonial period of 1898-1960 carried further pressures for migration in these countries [6]. Migration goes to reply to a cyclic downswing, seasonal food, and cash shortages, which has been part of the region's way of life for at least the last two centuries.

In recent years, irregular migration from Africa especially Sahelian countries to Europe has received much attention; Mali is one of the most highlighted. While there is a consensus on Malian emigration trends, there are conflicting estimates regarding the current emigrant stock. The Malian government through the Ministry of Malians Abroad and African Integration refers to a figure of 4 to 4.5 million nationals abroad, thus, around a quarter of the whole population of Mali, including 3.5 million in Africa. In terms of the destination of migrants, Côte d'Ivoire is by far the most common country of residence of Malian abroad in 2010, followed by Nigeria, and Niger.

The profile of migration in Mali shows that this landlocked Sahelian country remains principally a country of emigration, although increasing numbers of irregular migrants appear to transit through Mali on their way to Europe via the Maghreb countries[1].

Emigration has long been in Mali and is a central component of Malian society. Its patterns and evolution during modern times are well-known and well-documented [7]. During colonial times, Mali was used as a labour reserve for the development of agricultural projects and major industries, such as the production of groundnuts in Senegal. After the Second World War and the pronouncement of independence in 1960, the country remained an important provider of workforce for coastal West African countries such as Côte d'Ivoire, Senegal, and Ghana. Given the additional restrictive approach towards migration approved by France from 1970s onwards and the decline of Côte d'Ivoire as an attractive destination, new destinations within West Africa became progressively popular.

3. METHODS

3.1 Study Area

The third region of Mali, Sikasso is the capital city of the region is the most populated region of Mali 1,782,157 inhabitants in 1987, 2,625,919 inhabitants in 2009. The region of Sikasso is divided into seven (7) cercles (prefecture or department): Bougouni, Kadiolo, Koutiala, Kolondièba, Sikassa, Yanfolila and Yorosso. Located in the southern part of the country, it is the southern-most region of Mali, it is located between 11°11'59"N and 7°5'49"W (Fig. 1). Sikasso region is at 375 kilometers from southeast of Bamako, the capital city, borders the north of Côte d'Ivoire and the west of Burkina Faso. The region covers a total area of 70,280 km^2 as density 37/km^2.

The local economy is fundamentally based on farming and Sikasso region receives more precipitations than any other Malian region. It is known for its numerous vegetables and fruits (particularly mangoes, for which Sikasso is especially renowned), commonly called kenedougou (region of greenery). Agriculture remains the main source of subsistence, for the majority of the residents of this region; however, the mechanization of agriculture is far from favorable due to the poor situation of the country itself.

Over the total production of cereals crops, the region of Sikasso alone produces 32% of the national production (CSP/SDR, 2017/2018).

The major ethnic groups of the region include the Senoufo, acknowledged for masks and reverence for animals, closed to them the Samoghos people, recognized for being the best farmers of the whole country. Sikasso region abounded in the main ethnic group of Mali, the Bambara people.

Sikasso region was selected because of the current state of migration in this region and the accessibility. The recent researches on migration showed that Sikasso becomes the place most affected by migration [8].

[1] *https://mali.iom.int/news/mali-remains-country-emigration-and-transit-iom-migration-profile-confirms*

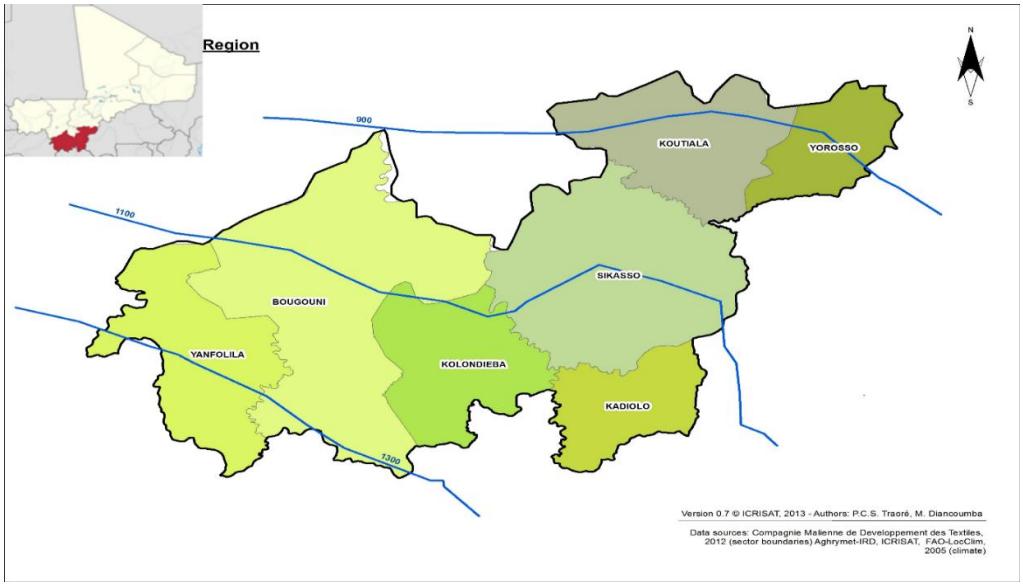

Fig. 1. Map of Sikasso region showing the study area (the seven cercles of the region)

Table 1. population and number of household in this region by cercle in 2018

Cercle	1	2	3	4	5	6	7
Population	982415	612915	323355	269284	77581	284328	282843
Household	148 851	92 866	48 993	40 801	11 755	43 080	42855

Source EAC 2017/2018. Our own calculation (Sikasso=1; Bougouni=2; Kadiolo=3; Kolondièba=4; Koutiala=5; Yanfolila=6; Yorosso=7)

Table 2. Data distribution

Cercles	Sikasso	Yanfolila	Koutiala	Bougouni	Kadiolo	Kolondieba
Household Surveyed	82	70	60	44	30	14

3.2 Data

Collected during May 2018, data is cross-section data, recorded in all the cercles of the region of Sikasso, except Yorosso (due to lack of accessibility). The target population is all resident household in the region of Sikasso. The estimated population in 2016 using the 2009 general population household survey is estimated to 3,336,752 inhabitants (Direction Nationale de la population 2016). This population is mostly employed in agriculture sector. L'Enquête Agricole de Conjuncture (EAC) of 2017/2018 revealed that population involved in agriculture in this region is 2,885,683 inhabitants for a number of 429 201 households, this represents more than 86% of the total population in this region (CPS/SRD) (Rapport EAC 2017/2018). However, the sample unit in the research is the household. A multi-stage sampling procedure was used in this study. So that the combination of several forms of sampling procedures was employed to settle it. The multi-stage sampling procedure is a very flexible procedure mostly used to collect cross sectional data as this case involves.

Primarily the south-Est region of Mali (Sikasso) was selected because several interests (highlighted in the study area), then concerning the selection of the cercles was based on the most affected by the phenomenon migration such as emigration. In fact, over the seven of cercles of the region, six were selected based on the high density of population, the accessibility to these cercles and the impact by emigration issue according to previous researches [8]. Randomly chose two communities corresponding to two villages or cities. The selected cercles include Sikasso, Bougouni, Kadiolo, Kolondièba, Koutiala, Yanfolila (see map for location).

3.3 Data Analysis

3.3.1 Estimation strategy of the multinomial logistic regression model

From the literature, people migrate for several reasons including environmental or climate shocks. This means that a holistic approach must be adopted to identify the factors influencing the purpose for a migration. This is important as it will reveal the category of people migrating for a particular purpose, hence, policy variables that must be address to reduce or otherwise migration in rural Mali. The study would employ the multinomial logistic model (MNL) to address this objective. The multinomial logistic method is a limited dependent model that allows estimating the probability of deciding from a set of more than two alternatives. The technique simultaneously compares any given outcome with a reference outcome.

Historically, the inadequacy of natural resources to meet people's needs push them to leave their original settlement to another. This is largely due to lack of land or infertility of soil. Aside from this, one key factor of migration in the Sahel, especially, Mali is poverty which drives people to move to a zone where there are high opportunities for employment [9,10]. For instance, in Mali, the cotton crisis facilitates the migration of a number of young people to look for work, also to get better living conditions or to escape local clanship rivalries. The specific characteristics of the Sahel zone, particularly, the long period of dry season, which is worsening over the years, has introduced another dimension into the drivers of migration. [10] concluded that the main factors, which cause migration in the Sahel zone especially in Mali, are passive rainfall, poverty and loss of production. Given the above description, one can conclude that the main reasons for rural migration in Mali are poverty, unemployment, demographic pressures, and climatic conditions. These drivers are non-exogenous, which means that they are influenced by a set of factors. To model for such multiple endogenous variable, the model can be given as:

$$P(y_i = j) = F_{ij}(X_{ij}^{'}\beta), \qquad i = 1, 2, ...N, \;\; j = 0,1,2 \tag{1}$$

Where $P(y_i = j)$ is the probability that an individual i will migrate due to the reason, j. $P(y_i = 0)$, is computed when there are two probabilities. Therefore,

$$\sum_{j=0}^{2} P(y_i = j) = 1 \tag{2}$$

The multinomial logit model is given as

$$P(y_i = j) = \frac{\exp(X_{ij}^{'}\beta)}{\sum_{k=0}^{2}\exp(X_{ij}^{'}\beta)} \tag{3}$$

In this case, the log likelihood is specified by

$$\ln L = \sum_{i=1}^{N}\sum_{j=0}^{2} y_{ij} \ln P_{ij} \tag{4}$$

Where the variable y_{ij} is 1 when $y_i = j$ and 0 if otherwise.

Parameter β_j is required for the logit measurement for maximizing the log likelihood function in equation (4). Specifically, a new variable $X_0, X_1, ...X_M$, is specified for each explanatory variable X depending on the number of options. Coefficient estimates are computed with the coefficient X_j $(j = 1,2,.....M)$ where the X_0 coefficient is standardized as 0. In other words, the coefficient is estimated at $(\beta_j - \beta_0)$.

4. RESULTS AND DISCUSSION

4.1 Descriptive Characteristics of the Sample

The characteristics of our sample carry out some of the most important characteristics of the region of Sikasso. With a fine diversified ethnic group, Bambara represents 27.67% of the sample, compared to the ethnic group Foulani (peulh), which corresponds to 26.33%. The ethnic groups Mianka, Sénofou and Samoghos are some of the ethnic groups dominant in this region, they represent respectively in this sample 18.66%, 10.67% and 10%. In fact, the remaining percentage of ethnic groups is sharing between Sarakolé, Dafi, Bobo, Djonka and Gana.

From the colonial time up to the two last decades, the region of Sikasso was the most preferred place by the agricultural producers cause of it high rainfall, confirmed by the sample, 10% of the head households migrated to the region, which is in line with the report of [11].

Over the 300 observations, more than 66% are employed in agricultural sector closed to the finding of the national institute of statistic (2015). The second high frequency is the breeder amount 15.33% of the sample, against 6.33% of traders. Only 4.67% of the household head work in the public sector, instead of working as joiner, butcher, builder, tailor, driver, pump attendant, tapestry-maker, marabout or housewife which represent 7% of the whole sample.

The main crop cultivated in the study area goes from cotton to peanut; include maize, sorghum, and millet. According to EAC (2017/2018), the region of Sikasso came first in total producing cereals crops 31.01% of the whole country production. In this sample, the surface used to cultivate these crops are very variable from a producer to another one. In fact, the yield also highly varies from one producer to another one.

The most cultivated crop is maize; the average cultivated land is about 3.43 hectare with 3.471 tons. The crop cotton follows maize but the area cultivated in cotton is high than for the other crops. In average, cotton is cultivated on 4.08 hectares, with 3.823 tons as average yield in the study area. The remain cereals crop sorghum, millet and peanut are respectively 3.13 hectares, 2.99 hectares and 1.29 hectares with respectively 2.218, 2.073 and 0.809 tons as average yield (Table 3).

4.2 Characteristics of the Surveyed Household

The surveyed households characteristics is presented in Table 4. The main activity of the household head of the sample is agriculture in the study site, which employs 66.67% of the total sample; this is in line with the reality in Mali, the agricultural sector employs over 80% of the active population of Mali. Follow by breeding practice 15.33% of the whole sample and the

Table 3. Characteristics of the sample

Items	Number	Mean or %
Native of place	271	90.33
Number of years in village/town of non-native	29	18.72 (15.77)
Ethnic group		
Bambara	83	27.67
Peulh	79	26.33
Mianka	56	18.66
Sénoufo	32	10.67
Samogo	30	10
Other ethnic	20	6.67
Main activity		
Agriculture	200	66.67
Breeding	46	15.33
Trade	19	6.33
Public worker	14	4.67
Others main activity	21	7
Crop production		
Maize area cultivated	234	3.43 (2.33)
Yield of maize	234	3471.12 (3111.21)
Cotton area cultivated	128	4.08 (2.64)
Yield of cotton	128	3823 (3015.05)
Millet area cultivated	95	2.99 (2.34)
Yield of millet	95	2073.56(2221.62)
Groundnut area cultivated	86	1.29 (1.45)
Yield of groundnut	86	809.71(1255.35)
Sorghum area cultivated	45	3.13 (3.39)
Yield of Sorghum	45	2218.88(2553.72)

Table 4. Household surveyed characteristics

	All	Migrant	Non migrant
	(n=300)	(n=246)	(n=54)
Household head sex	91% Male	90.65% Male	92.59% Male
Average age	52.49	52.91	50.55
	(15.17)	(15.52)	(13,44)
Household size	19.83	20.77	15.51
	(13.82)	(14.06)	(11.86)
Number of schooling years	7.74	7.44	9.28
	(4.07)	(3.76)	(3.76)

Standard error in parentheses

Table 5. Characteristics of the migrants

Characteristics	N	Mean or %
Sex		
Male	518	94.18
Female	32	5.82
Age	550	25.49 (8.13)
Marital status		
Unmarried	201	36.55
Married	340	61.82
Divorced and widowed	9	1.64
Migrant activity before leaving		
Agriculture	366	66.79
Commerce	57	10.40
Study	45	8.21
Breeding	57	10.40
Other	23	4.20
Destination of the migrant		
Rural (village)	29	5.10
Urban (main town in the country)	303	55.19
Continental (in Africa)	169	30.78
International (Out of Africa)	49	8.93
Transfer	550	51.64
Average amount of transfer	205	142124.39 FCFA (151326.23)

other activities include civil work, homemaker, tailor, mechanic, drive, stonework and joiner. In more of doing a main activity, 60.67% of the household head practice a second activity, the reason for doing a second activity varies from one household head to another. The main reasons of doing second activity include: 37.91% say to raise the revenue to improve the life condition, 24.73% of those practicing secondary activity do it to prevent or to bear day-to-day expenditure of the family, such as 15.93% give as reason support the production of the season. There was 6.59 percent of the surveyed population practicing second activity to improve their living conditions, the remains 15% is sharing between, overcome unexpected event, and practice by passion, by pleasure, to achieve the expensive of the condiments, revenue diversification and avoid unemployment.

4.3 Characteristics of the Migrants

Table 5 contains the characteristics of the migrants, around 550 migrants were surveyed amount 246 households, in average, which is more than two migrants per household as average (2.23). However, sharing on the whole sample it likely 1.83 migrants per household. Most of the migrants are men such as 94.18 % against 5.82% women. Very young people are the migrants so that the average age of them turns around 25.49 years old with a standard error of (8.13).

Regarding the marital status of the migrants 61.82% of them are married and 36.55% are unmarried, only 1.64% which is the remain sharing between divorced and widowed

migrants. Sikasso's region primary activity is based on agriculture why around 2/3 (66.79%) of the migrants were employed in the agricultural sector before leaving their own place. In breeding and commerce activities, 10.40% were working in each of these sectors. About destination of migrants, more than 60% move internally that is in line with the report of RGPH 2009. Average amount transfer by migrant to the family behind is 142124.39 FCFA with a standard deviation of 151326.23.

4.4 Migration Causes

In Table 6 reveals the distribution in percentage of the migrants by region of depart and by reason of leaving. The intensity of leaving linked to the different reasons of migration varies from place to place. These factors include economic, social aspect, professional, politic, study and health. From the fourth general population and housing census of 2009, most of the emigrants evoked that the economic reason is the main principal causes of the out-migration in Mali (87.2%). There are other causes reveal by the migrants such as social causes (9%), leave for studying (4.2%) and professional causes (2.4%). In all regions, the economic cause is the first cause of migration in 2/3 in case, with the smallest proportion in Bamako (62.3%), the highest proportion was recorded in Kayes' region (92.9%). Household concern is the most cited in Gao's region (12.1%), Kidal's region (11.7%) and for the district of Bamako (10.4%). The motive to study is high revealed by Bamako's emigrants (19.6%) and the region of Kidal (10.2%).

4.5 Drivers of Migration in Mali

This section analyzed the determinants of migration in the study area. From the survey, the push factors that lead to migration were classified under three major factors such as poverty or unemployment, environmental challenges, and others including curiosity, marriage and schooling. These primary and mutually exclusive factors force individuals to migrate to other locations. Therefore, a multinomial logic regression was estimated with the 'other factors' as the reference group. The objective in this section is to identify the socioeconomic characteristics of migrants based on the push factors. For instance, to identify the characteristics of people who migrant due to bad weather or environmental challenges. From the result, the factors that significantly influenced migration were sex, age, and age squared, household size, labour constraint, and location. The report of the research is in line with many previous studies on climate change induced such as [12,13,14].

The effect of sex on migration is positive and significant for migration due to environmental challenges and migration due to poverty or unemployment, similar to the result found by [15] in their research on human security in the fifth report of Intergovernmental Panel on Climate Change to contribute to the Working Group II of 2014. This implies that males would migrate due to environmental shocks such as drought or flood than females. In terms of marginal change, relative to other factors, males have a 0.033 probability more of migration if the weather becomes unfavourable revealed also by [15] and the production environment becomes unconducive for higher yield. This is due to the fact that males are most the case the breadwinners of the family in one hand and in other hand surely men are generally additional adventurous than the women [16]. Moreover, when the environment is no longer

Table 6. Sharing (in %) of the emigrants, by region of depart and by motive of migration

Region of depart	Reasons of migration					
	Economic	Social	Professional	Politic	Study	Health
Kayes	92.9	4.1	0.7	0.1	1.9	0.3
Koulikoro	90.4	4.4	1.9	0.1	2.7	0.5
Sikasso	86.5	8.8	1.7	0.2	2.6	0.3
Ségou	90.4	5.5	1.3	0.1	2.4	0.2
Mopti	92.7	4.7	1.1	0.1	0.9	0.4
Tombouctou	89.2	5.5	3.1	0.2	1.1	0.8
Gao	79.4	12.1	2.7	0.1	3.6	2.1
Kidal	69.5	11.7	5.5	0.8	10.2	2.3
Bamako	62.3	10.4	6.5	0.2	19.6	1
Total	87.2	6	2	0.1	4.2	0.5

Source: RGPH 2009 our own calculation

supportive of the farm activities of the household, it still remained the duty of the male to ensure that there is food for household consumption. Therefore, to fulfill their responsibility of breadwinner, they have to migrate to other areas where their environment is good for farm activities or where they can get other non-farm activities to do and earn higher income to meet the primary needs of their households. In addition, because females are child bearers [16], they have limited opportunity to migrate even if they are unemployed or there are environmental shocks. In fact, for a female to migrate, she has to migrate with her children while men often migrate as an individual and leaving the children with their mother. In terms of personals, factors comprise gender and age and also ethnicity, all these factors are able to push people to decide to move or to stay on their origin place [17,18].

The effect of age on migration is negative while the effect of age squared is positive. However, the effect is significant for only migration due to environmental challenges. The negative effect of age and the positive sign of age-squared means that the younger farmers have a higher probability of migrating to other areas with less environmental challenges than the elderly, this result confirmed what found by [19]. In fact, in the study area migration is surely driven by their demographic characteristics (age, gender, ethnicity and so on) [18]. However, in the long run (where environmental challenges persists), the elder would also migrate. The result shows that a unit increase in age leads to 0.01 decrease in the probability of migrating due to environmental factors but in the long run, a unit increase in age would lead to 0.001 increase in the probability of migrating due to environmental challenges. This is consistent with the expectations of the researcher. Generally, the younger farmers in the rural areas often have the desire for migrating to the cities and other parts of the world for other economic activities. Therefore, with the influence of changes in the environment, these individuals may become more poise for satisfying their desires and hence, migrate, additionally when the situation is unbearable for farmers to stay at their origin place [20]. With a persistent bad environment, the elderly farmers may also migrate because there is nothing they can rely on to provide food and other basic needs for their families.

The effect of household size on migration is negative and significant for migration due to poverty and migration due to environmental challenges. However, the marginal effects of migrating due to poverty (-0.003) is lower than migration due to environmental challenges (-0.002). The negative effect means that farmers with larger family members have a lesser probability of migrating due to poverty and environmental challenge relative to other factors. Thus, with higher family members, the probability for migrating due to factors such as curiosity, marriage and passion is higher than migrating due to poverty and environmental challenges. This is contrary to the research expectations since an increase in household size may have negative implications on the poverty status of the household and household's assets level or distribution, hence should migrate due to poverty or environmental challenges. However, the survey revealed that the social tie among larger households is weak; therefore, they can easily migrate even for passion without its effect on the remaining family.

Labour constraint had a positive significant effect on migration due to poverty/unemployment and environmental challenges [21]. This implies that respondents who indicated a lack of agricultural labour perceived that people migrate due to poverty, unemployment or environmental factors, relative to migrating due to other factors. The result revealed that a farmer who lacks labour have a probability of 0.055 units more of migrating due to poverty or unemployment and a probability of 0.016 units more of migrating due to environmental challenges, than migrating due to other factors. This implies that the lack of labour has a major implication on migration due to poverty or unemployment than migrating due to environmental challenges and other factors. The lack of labour affects the production of crops since the use of mechanized agriculture is low among farmers. Thus, there is a high reliance on human labour for crop production. Therefore, the lack of labour would lower crop production [22] and farmers who rely largely on external labour would be forced out of farming, hence, becoming poor and underemployed. Environmental challenges also require that more labour is involved in the production of the crop since extra farm activities are supposed to be performed by the farmers. It is therefore not surprising that farmers who lack labour for crop production perceived that there is a higher probability of migrating due to poverty and environmental challenges.

The location factors that had significant effect on migration were locating in Yanfolila, Bougouni

and Koutiala. All these cercles/departments locations were positive and significant for migration due to poverty or unemployment and migration due to environmental challenges. These imply that farmers who are located in these cercles/departments relative to those located in the reference cercles/departments Sikasso, have a higher probability of migrating due to poverty or environmental challenges and no other push factors. Comparing these cercles to the referring group of Sikasso's cercle, Sikasso has more public infrastructures, more opportunities than all these others cercles. In fact, Sikasso cercle is the main cercle of the region. Regarding Koutiala (called the capital of white gold) such as the main activity in this cercle is the production of the cotton, once there is a climate extreme (drought or flood), which is not good for this crop, farmers have no other choice to fulfill this situation better migration. In case of Yanfolila cercle, as an administrative subdivision of the region of Sikasso, it is a place of gold washing, which instantly increase the price of basics goods to be high to the farmers (the villagers). Bougouni, the administrative centre of the cercle, it is a cercle closed to the cercle of Yanfolila with approximatively the same characteristics. The main activity of this location remains agriculture. Once the environment degradation becomes worst or there is an event of climate change, farmers have obliged to look for a better condition for their livings. This is why most of the studies investigating migration as a strategy to cope with climate variability have principally focused on rural areas [23]. Because researches found evidence that the effect of climate change on migration operates principally through employment in the agricultural sector [23].

4.6 Joint Probability of Push Factors

The table below shows the estimated probability of migrating due to each of the push factors of migration. From the result, the probability of migrating due to poverty or unemployment is 0.756. Thus, the major push factor for migration is poverty or unemployment. The estimated probability of migrating due to environmental challenges is 0.136 while migrating due to other push factors is 0.106. This result indicates that to address migration among farmers, the major push factor to consider is improving the welfare of the people and move agriculture from the current subsistence status to a commercial status where farmers would see agriculture as a business and engage in large-scale production. However, since environmental challenges can worsen the poverty status of the farmers, it is also crucial that environmental factors are also given prime attention in addressing migration issues among farmers.

Table 7. Multinomial logistic regression results

Variables	Poverty/unemployment			Environmental challenges		
	Coeff.	S.E	mfx	Coeff.	S.E	mfx
Sex	2.16***	0.71	0.141	2.26**	0.88	0.033
Age	-0.16	0.11	-0.002	-0.25*	0.14	-0.01
Age squared	0.002	0.001	0.0001	0.002*	0.001	0.001
House size	-0.03*	0.01	-0.0003	-0.04**	0.02	-0.002
Education	0.66	0.06	0.003	0.08	0.72	0.001
Secondary activity	0.02	0.45	0.02	-0.26	0.57	-0.029
Impact income	0.81	0.5	0.057	0.8	0.64	0.007
Migration strategy	-0.13	0.47	-0.047	0.29	0 .63	0.041
Change in village	0.25	0.49	0.052	-0.12	0.65	-0.035
Labour constraint	0.88**	0.44	0.055	0.95*	0.56	0.016
Yanfolila	1.08*	0.61	0.018	2.67***	0.99	0.095
Bougouni	2.89**	1.18	0.024	4.89***	1.43	0.153
Kadiolo	0.36	0.86	0.066	-13.92	1269.63	-0.024
Koutiala	0.11	0.54	-0.273	3.30***	0.91	0.34
Kolondieba	15.98	1901.24	0.067	17.75	1901.24	0.125
Constant						

*Significance level ***=1%; **=5%; *=10% (S.E= Standard Error, mfx =Marginal effects)*
Notes: change in village = change in the village by migration or not; migration strategy is to adapt or not; impact income= impact of migration on income

Table 8. Joint probability of push factors

Variable	Mean	St-dev	Min	Max
Poverty/Unemployment	0.756	0.153	0.120	0.982
Environmental challenges	0.136	0.126	8.21^{-9}	0.524
Other push factors	0.106	0.122	2.18^{-9}	0.876

5. CONCLUSION

The objective of this research was to identify the socioeconomic characteristics of migrants based on the push factors. For instance, to identify the characteristics of people who migrate due to bad weather or environmental challenges. Cross-sectional data was used for the analysis in this estimation. The use of multinomial logistic regression is the fact migration issue has many causes. From the result, the factors that significantly influenced migration were sex, age, and age squared, household size, labour constraint, and location. The probability of migration due to poverty or unemployment is very high than the other push factors such as environmental challenges. The fact to not overcome the environmental challenges is due to the vulnerability of the population. Therefore, the government should focus its effort on the first point of sustainable development goals that is "no poverty".

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. A. de Haan, Brock K, Coulibaly N. "Migration, Livelihoods and Institutions: Contrasting Patterns of Migration in Mali," J. Dev. Stud. 2002;38(5):37–58,
2. Findley SE. "Does Drought Increase Migration ? A Study of Migration from Rural Mali during the 1983- 1985 Drought," Int. Migr. Rev. 1994;28(3):539–553.
3. Grace K, Hertrich V, Singare D, Husak G. "Examining rural Sahelian out-migration in the context of climate change: An analysis of the linkages between rainfall and out-migration in two Malian villages from 1981 to 2009," World Dev. 2018;109:187–196.
4. Land DH. Victoria van der, "Vulnerability and the role of education in environmentally induced migration in Mali and Senegal," Ecol. Soc. 2013;18(4).
5. Patrick GONIN NK. "Migrations et pauvreté : Essai sur la situation malienne," Ceriscope; 2012.
6. Findley BSE. "Mali: Seeking Opportunity Abroad," Migr. Policy Inst. 2004;1–11.
7. division UN P. "Mali Migration," In Migration in Mali. 2015;221–239.
8. International Organization for Migration (IOM), "Migrations environnementales au Mali Rapport préliminaire"; 2015.
9. Bossard L. "Questions d'avenir(s) pour les pays sahéliens de l'Afrique de l'Ouest," Sécheresse. 2004;15(3):225–232.
10. Cissé P, Malicki Z, Barbier B, Maïga A. "Les migrations, une stratégie d' adaptation à la variabilité climatique en zones sahéliennes Résumé," RGLL, no. 2005. 2010;184–196.
11. INSTAT-Mali. "Accessibilité qux soins de santé, appréciation de la population sur les actions prioritaires à entreprendre et dépenses de consommation des ménages"; 2017.
12. IPCC. "Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change"; 2014.
13. Rigaud KK, et al. "Preparing for internal climate migration," Washington, DC World Bank. 2018;256.
14. Black R, Kniveton D, Schmidt-Verkerk K. "Migration and Climate Change: Toward an Integrated Assessment of Sensitivity," Springer. 2015;29–53:1–259,
15. Adger Wn, Nigel W Arnell, Richard B, Dercon S, Andrew Geddes, DSG Thomas. "Focus on environmental risks and migration : Causes and consequences," Environ. Res. Lett. 2015;10(6):60201.
16. Elijah Y, Francis D, Augustine T, Anthony MTN. "Drivers of north-south migration in the Wa West District: Economic returns or migrants sub-culture," J. African Stud. Dev. 2016;8(6):67–80.
17. Lee ES. "A Theory of Migration," Springer behalf Popul. Assoc. Am. 1996;3(1):47–57.
18. Zickgraf C, De Longueville F, Ozer P. "The Impact of Vulnerability and Resilience to Environmental Changes on Mobility Patterns in West Africa," Environ. Behav.

2016;2:3–31.
19. Hatton TJ, Williamson JG. “Demographic and economic pressure on emigration out of Africa,” Scand. J. Econ. 2003;105(3): 465–486,
20. Awumbila M, Teye JK, Litchfield J, Boakye-Yiadom L, Deshingkar P, Quartey P. “Are Migrant Households better off than Non-Migrant Households? Evidence from Ghana,” Migrating Out Poverty. Working Pa. 2015;1–47.
21. Docquier F, Ozden C, Peri G. “The Labour Market Effects of Immigration and Emigration in OECD Countries”; 2014.
22. De Brauw A. “Migration, Youth, and Agricultural Productivity in Ethiopia,” Mimeo; 2014.
23. Nawrotzki RJ, Hunter LM, Runfola DM, Riosmena F. “Climate change as a migration driver from rural and urban Mexico,” Environ. Res. Lett. 2015;10(11).

Peer-review history:
The peer review history for this paper can be accessed here:
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