

# Analyse the perception level and the causes of migration in Mali.

## 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.

Key words: migration drivers, multinomial logit, rural Mali, environmental challenges.

## 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 a rite of passage road 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 onto the population to high displacement in this country.

Besides all those things, migration in Mali is not a new issue,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

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39 agriculture is mostly promoter. Irregularity in the rainfall and the fall of the price of cotton  
40 destabilize the stay of the population. Therefore they use to choose one of the three  
41 strategies rural livelihoods, which is migration among– agro-pastoral activities and  
42 livelihood diversification [1].

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

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

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### 53 **MIGRATION TRENDS IN MALI**

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

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

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71 During November 1-5, in 1999, the First Ministerial meeting on Migration and  
72 Urbanization in West Africa took place in Bamako, Mali. Perhaps due to the high  
73 migration in the country. Migration occurs in Mali since the pre-colonial time and its  
74 practices is both a transit point to get to North Africa and depart to the other continents  
75 such as Europe and Asia. Migration is so deeply ingrained in Malian's culture, therefore in  
76 certain regions; young people are not allowed to marry until they have gone abroad. The

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77 economic and political structure of French in West Africa during the colonial period of  
78 1898-1960 carried further pressures for migration in these countries [6]. Migration goes to  
79 reply to a cyclic downswing, seasonal food, and cash shortages, which has been part of the  
80 region's way of life for at least the last two centuries.

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

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

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

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## 102 METHODS

### 103 Study area

104 The third region of Mali, Sikasso is the capital city of the region is the most populated  
105 region of Mali 1,782,157 inhabitants in 1987, 2,625,919 inhabitants in 2009. The region of  
106 Sikasso is divided into seven (7) cercles (prefecture or department): Bougouni, Kadiolo,  
107 Koutiala, Kolondièba, Sikassa, Yanfolila and Yorosso. Located in the southern part of the  
108 country, it is the southern-most region of Mali, with coordinates 11°11'59"N 7°5'49"W.  
109 Sikasso region is at 375 kilometres from southeast of Bamako, the capital city, borders

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<sup>1</sup> <https://mali.iom.int/news/mali-remains-country-emigration-and-transit-iom-migration-profile-confirms>

110 | the north of Côte d'Ivoire and the west of Burkina Faso.- The region covers a total area of  
111 | 70,280 km<sup>2</sup> as density 37/km<sup>2</sup>.

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

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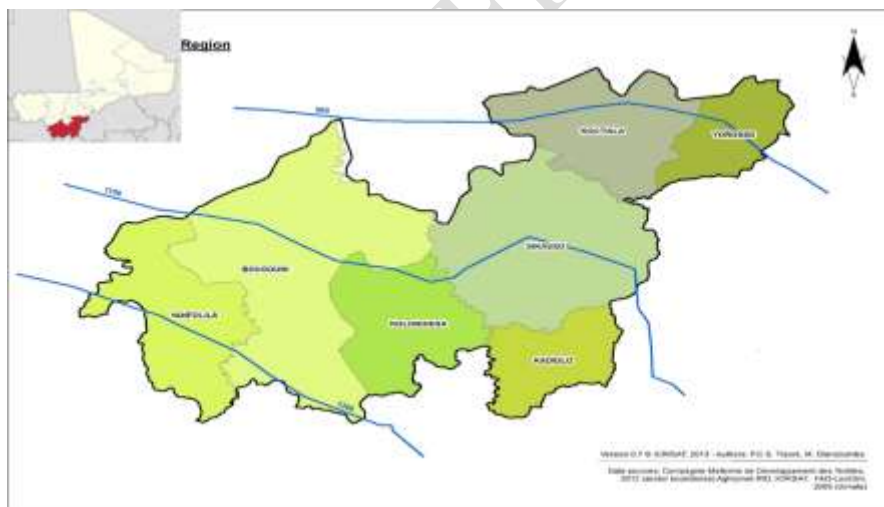
118 | Over the total production of cereals crops, the region of Sikasso alone produces 32% of  
119 | the national production (CSP/SDR, 2017/2018).

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

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

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128 | Figure 1: Map of Sikasso region showing the study area (the seven cercles of the region)

129 | **Data**

130 Collected during May 2018, data is cross-section data, recorded in all the cercles of the  
 131 region of Sikasso, except Yorosso. The target population is all resident household in the  
 132 region of Sikasso. The estimated population in 2016 using the 2009 general population  
 133 household survey is estimated to 3,336,752 inhabitants (Direction Nationale de la  
 134 population 2016). This population is mostly employed in agriculture sector. L'enquête  
 135 Agricole de Ceonjuncture (EAC) of 2017/2018 revealed that population involved in  
 136 agriculture in this region is 2,885,683 inhabitants for a number of 429 201 households, this  
 137 represents more than 86% of the total population in this region (CPS/SRD) (Rapport EAC  
 138 2017/2018). However, the sample unit in the research is the household. A multi-stage  
 139 sampling procedure was used in this study. So that the combination of several forms of  
 140 sampling procedures was employed to settle it. The Mmulti-stage sampling procedure is a  
 141 very flexible procedure mostly used to collect cross-sectional data as this case involves.

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

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150 **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

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

153 **Table 2 : Data distribution**

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

154

155 **Data analysis**

156 *Estimation strategy of the multinomial logistic regression model:*

157 From the literature, people migrate for several reasons including environmental or climate  
 158 shocks. This means that a holistic approach must be adopted to identify the factors  
 159 influencing the purpose for a migration. This is important as it will reveal the category of

160 | people migrating for a particular purpose, hence, policy variables that must be addressed  
 161 | to reduce or otherwise migration in rural Mali. The study would employ the multinomial  
 162 | logistic model (MNL) to address this objective. The multinomial logistic method (MNL)  
 163 | is a limited dependent model that allows to estimate/estimating the probability of deciding  
 164 | from a set of more than two alternatives. The technique simultaneously compares any  
 165 | given outcome with a reference outcome.

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166 | Historically, the inadequacy of natural resources to meet people's needs push them to  
 167 | leave their original settlement to another. This is largely due to lack of land or infertility of  
 168 | soil. Aside from this, one key factor of migration in the Sahel, especially, Mali is poverty  
 169 | which drives people to move to a zone where there are high opportunities for employment  
 170 | [9, 10]. For instance, in Mali, the cotton crisis facilitates the migration of a number of  
 171 | young people to look for work, also to get better living conditions or to escape local  
 172 | clanship rivalries. The specific characteristics of the Sahel zone, particularly, the long  
 173 | period of the dry season, which is worsening over the years, has introduced another  
 174 | dimension into the drivers of migration. [10] [The phrase is awkward in this way.  
 175 | Suggestion: "The study concludes..." a concluded that the main factors, which cause  
 176 | migration in the Sahel zone especially in Mali, are passive rainfall, poverty, and loss of  
 177 | production.- Given the above description, one can conclude that the main reasons for rural  
 178 | migration in Mali are poverty, unemployment, demographic pressures, and climatic  
 179 | conditions. These drivers are non-exogenous, which means that they are influenced by a  
 180 | set of factors. To model for such multiple endogenous variable, the model can be given  
 181 | as:

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$$182 \quad P(y_i = j) = F_{ij}(X_{ij}'\beta), \quad i = 1, 2, \dots, N \quad j = 0, 1, 2. \quad (1)$$

183 | Where  $P(y_i = j)$  is the probability that an individual  $i$  will migrate due to the reason,  $j$ .

184 |  $P(y_i = 0)$  is computed when there are two probabilities. Therefore,

$$185 \quad \sum_{j=0}^2 P(y_i = j) = 1. \quad (2)$$

186 | The multinomial logit model is given as

$$187 \quad P(y_i = j) = \frac{\exp(X_{ij}'\beta)}{\sum_{k=0}^2 \exp(X_{ij}'\beta)} \quad (3)$$

188 | In this case, the log likelihood is specified by

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

(4)

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

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

## RESULTS AND DISCUSSION:

### Descriptive characteristics of the sample

The characteristics of our sample carries out some of the most important characteristics of the region of Sikasso. With a fine diversified ethnic group, Bamabara 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, there represent respectively in this sample 18.66%, 10.67% and 10%. In fact, the remaining percentage of ethnic groups is sharing between Sarakolé, Dafî, 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 variable from one producer to another one.

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221 The most cultivated crop is maize; the average cultivated land is about 3.43 hectare with  
 222 3.471 tons. The crop cotton follows maize but the area cultivated in cotton is high than for  
 223 the other crops. In average, cotton is cultivated on 4.08 hectares, with 3.823 tons as  
 224 average yield in the study area. The remain cereals crop sorghum, millet and peanut are  
 225 respectively 3.13 hectares, 2.99 hectares and 1.29 hectares with respectively 2.218, 2.073  
 226 and 0.809 tons as average yield.

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227 **Table 2 : 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)
<b>Ethnic group</b>		
Bambara	83	27.67
Peulh	79	26.33
Mianka	56	18.66
Sénoufo	32	10.67
Samogo	30	10
Other ethnic	20	6.67
<b>Main activity</b>		
Agriculture	200	66.67
Breeding	46	15.33
Trade	19	6.33
Public worker	14	4.67
Others main activity	21	7
<b>Crop production</b>		
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)

228

229 **Characteristics of the surveyed household**

230 The main activity of the household head of the sample is agriculture in the study site,  
 231 which employs 66.67% of the total sample; this is in line with the reality in Mali, the  
 232 agricultural sector employs over 80% of the active population of Mali. Follow by breeding  
 233 practice 15.33% of the whole sample and the other activities include civil work,  
 234 homemaker, tailor, mechanic, drive, stonework and joinery [Please check this]. In more  
 235 of doing a main activity, 60.67% of the household head practice a second activity, the  
 236 reason for doing a second activity varies from one household head to another. The main  
 237 reasons of doing second activity include: 37.91% say to raise the revenue to improve the

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238 | life condition, 24.73% of those practicing secondary activity do it to prevent or to bear the  
 239 | day-to-day expenditure of the family, such as 15.93% give as reason support the  
 240 | production of the season. There wasere 6.59 percent -of the surveyed population practicing  
 241 | second activity to improve their livingfe conditions, the remains 15% is sharing between,  
 242 | overcome unexpected event, and practice by passion, by pleasure, to achieve the  
 243 | expensive of the condiments, revenue diversification and avoid unemployment.

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245 **Table 3 : 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 (15.17)	52.91 (15.52)	50.55 (13,44)
Household size	19.83 (13.82)	20.77 (14.06)	15.51 (11.86)
Number of schooling years	7.74 (4.07)	7.44 (3.76)	9.28 (3.76)

246 *Standard error in parentheses.*

247 **Characteristics of the migrants:**

248 Around 550 migrants surveyed amount 246 households, more than two migrants per  
 249 household as average (2.23). However, sharing on the whole sample it likely 1.83  
 250 migrants per household. Most of the migrants are men such as 94.18 % against 5.82%  
 251 women. Very young people are the migrants so that the average age of them turns around  
 252 25.49 years old with a standard error of (8.13).

253 Regarding the marital status of the migrants, 61.82% of them are married and 36.55% are  
 254 unmarried, only 1.64% which is the -remain sharing between divorced and widowed  
 255 migrants. Sikasso's region primary activity is based on agriculture why around 2/3  
 256 (66.79%) of the migrants were employed in the agricultural sector before leaving their  
 257 own place. In-breeding and commerce activities, 10.40% were working in each of these  
 258 sectors.

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259 **Table 4 : Characteristics of the migrants**

Characteristics	N	Mean or %
<b>Sex</b>		
Male	518	94.18
Female	32	5.82
Age	550	25.49 (8.13)
<b>Marital status</b>		
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
<b>Destination of the migrant</b>		
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
Amount of transfer	205	142124.39

260 **Migration causes**

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

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272 **Table 5: Sharing (in %) of the emigrants, by region of depart and by motive of**  
273 **migration**

Region of depart	Reasons of migrations					
	Econo	Social	Professi	Politic	study	Health
Kayes	92.9	4.1	0.7	0.1	1.9	0.3
Kkoro	90.4	4.4	1.9	0.1	2.7	0.5
Sikso	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
Tbctou	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
Bamko	62.3	10.4	6.5	0.2	19.6	1
Total	87.2	6	2	0.1	4.2	0.5

274 Source : RGPH 2009 our own calculation

275 **Drivers of migration in Mali**

276 This section analysed the determinants of migration in the study area. From the survey,  
277 the push factors that leads to migration were classified under three major factors such as  
278 poverty or unemployment, environmental challenges, and others including curiosity,  
279 marriage, and schooling. These primary and mutually exclusive factors force individuals  
280 to migrate to other locations. Therefore, a multinomial logic regression was estimated with  
281 the 'other factors' as the reference group. The objective in this section is to identify the  
282 socioeconomic characteristics of migrants based on the push factors. For instance, to  
283 identify the characteristics of people who migrant due to bad weather or environmental  
284 challenges. From the result, the factors that significantly influenced migration were sex,  
285 age, and age squared, household size, labour constraint, and location. The report of the  
286 research is in line with many previous studies on climate change induced such as [12, 13,  
287 14]

288 The effect of sex on migration is positive and significant for migration due to  
289 environmental challenges and migration due to poverty or unemployment, similar to the  
290 result found by [15] in their research on human security in the fifth report of  
291 Intergovernmental Panel on Climate Change to contribute to the Working Group II of  
292 2014 [Same problem of the note 10. Please, rewrite with a better arrangement]. This  
293 implies that males would migrate due to environmental shocks such as drought or flood  
294 than females. In terms of marginal change, relative to other factors, males have a 0.033  
295 probability more of migration if the weather becomes unfavourable revealed also by [15]  
296 and the production environment becomes uncondusive for higher yield. This is due to the  
297 fact that males are most the case the breadwinners of the family in one hand and in other  
298 hand surely men are generally additional adventurous than the women [16] [This is value  
299 judgment and male bias!]. Moreover, when the environment is no longer supportive of the  
300 farm activities of the household, it still remained the duty of the male to ensure that there  
301 is food for household consumption. Therefore, to fulfil their responsibility of  
302 breadwinner, they have to migrate to other areas where they environment is good for farm  
303 activities or where they can get other non-farm activities to do and earn a higher income to  
304 meet the primary needs of their households. In addition, because females are child bearers  
305 [16], they have limited opportunity to migrate even if they are unemployed or there are  
306 environmental shocks. In fact, for a female to migrate, she has to migrate with her children  
307 while men often migrate as an individual and leaving the children with their mother. In  
308 terms of personals, factors comprise gender and age and also ethnicity, all these factors are  
309 able to push people to decide to move or to stay on their origin place [17,18].

310 The effect of age on migration is negative while the effect of age squared is positive.  
311 However, the effect is significant for only migration due to environmental challenges. The  
312 negative effect of age and the positive significant of age-squared means that the younger  
313 farmers have a higher probability of migrating to other areas with less environmental  
314 challenges than the elderly, this result confirmed what found by [19]. In fact, in the study

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315 area migration is surely driven by their demographic characteristics (age, gender, ethnicity  
316 and so on) [18]. However, in the long run (where environmental challenges persists), the  
317 elder would also migrate. The result shows that a unit increase in age leads to 0.01  
318 decrease in the probability of migrating due to environmental factors but in the long run, a  
319 unit increase in age would lead to 0.001 increase in the probability of migrating due to  
320 environmental challenges. This is consistent with the expectations of the researcher.  
321 Generally, the younger farmers in the rural areas often have the desire for migrating to the  
322 cities and other parts of the world for other economic activities. Therefore, with the  
323 influence of changes in the environment, these individuals may become more poise for  
324 satisfying their desires and hence, migrate, additionally when the situation is unbearable  
325 for farmers to stay at their origin place [20]. With a persistent bad environment, ~~the~~  
326 elderly farmers may also migrate because there is nothing they can rely on to provide food  
327 and other basic needs for their families.

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

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341 Labour constraint had a positive significant effect on migration due to  
342 poverty/unemployment and environmental challenges [21]. This implies that respondents  
343 who indicated a lack of agricultural labour perceived that people migrate due to poverty,  
344 unemployment or environmental factors, relative to migrating due to other factors. The  
345 result revealed that a farmer who lacks labour have a probability of 0.055 units more of  
346 migrating due to poverty or unemployment and a probability of 0.016 units more of  
347 migrating due to environmental challenges, than migrating due to other factors. This  
348 implies that the lack of labour hasve a major implication on migration due to poverty or  
349 unemployment than migrating due to environmental challenges and other factors. The lack  
350 of labour affects the production of crops since the use of mechanized agriculture is low  
351 among the the farmers. Thus, there is a high reliance on human labour for crop production.  
352 Therefore, the lack of labour would lower crop production [22] and farmers who rely  
353 largely on external labour would be forced out of farming, hence, becoming poor and  
354 underemployed. Environmental challenges also requires that more labour is involved in  
355 the production of the crop since extra farm activities are supposed to be performed by the

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356 farmers. It is therefore not surprising that farmers who lack labour for crop production  
 357 perceived that there is a higher probability of migrating due to poverty and environmental  
 358 challenges.

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

381 **Table 6 : 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

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Kolondieba 15.98 1901.24 0.067 17.75 1901.24 0.125  
Constant

382 Significance level \*\*\*=1%; \*\*=5%; \*=10% (S.E= Standard Error, mfx =Marginal effects)

383 Notes: change in village = change in the village by migration or not; migration strategy is  
384 to adapt or not; impact income= impact of migration on income.

385 Joint probability of push factors

386 The table below shows the estimated probability of migrating due to each of the push  
387 factors of migration. From the result, the probability of migrating due to poverty or  
388 unemployment is 0.756. Thus, the major push factor for migration is poverty or  
389 unemployment. The estimated probability of migrating due to environmental challenges is  
390 0.136 while migrating due to other push factors is 0.106. This result indicates that to  
391 address migration among farmers, the major push factor to consider is improving the  
392 welfare of the people and move agriculture from the current subsistence status to a  
393 commercial status where farmers would see agriculture as a business and engage in large-  
394 scale production. However, since environmental challenges can worsen the poverty status  
395 of the farmers, it is also crucial that environmental factors are also given a prime attention  
396 in addressing migration issues among farmers.

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397 Table 7: 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 <sup>-9</sup>	0.524
Other push factors	0.106	0.122	2.18 <sup>-9</sup>	0.876

398

### 399 Conclusion:

400 The objective of this research was to identify the socioeconomic characteristics of  
401 migrants based on the push factors. For instance, to identify the characteristics of people  
402 who migrant due to bad weather or environmental challenges. From the result, the factors  
403 that significantly influenced migration were sex, age, and age squared, household size,  
404 labour constraint, and location. Cross-sectional data was used for the analysis in this  
405 estimation. The use of multinomial logistic regression is the fact migration issue has many  
406 causes.

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