

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 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

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.

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.

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

56 **MIGRATION TRENDS IN MALI**

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

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

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

76 migration in the country. Migration occurs in Mali since the pre-colonial time and its
77 practices is both a transit point to get to North Africa and depart to the other continents
78 such as Europe and Asia. Migration is so deeply ingrained in Malian's culture, therefore in
79 certain regions; young people are not allowed to marry until they have gone abroad. The
80 economic and political structure of French in West Africa during the colonial period of
81 1898-1960 carried further pressures for migration in these countries [6]. Migration goes to
82 reply to a cyclic downswing, seasonal food, and cash shortages, which has been part of the
83 region's way of life for at least the last two centuries.

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

92 The profile of migration in Mali shows that this landlocked Sahelian country remains
93 principally a country of emigration, although increasing numbers of irregular migrants
94 appear to transit through Mali on their way to Europe via the Maghreb countries¹.

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

105 **METHODS**

106 **Study area**

107 The third region of Mali, Sikasso is the capital city of the region is the most populated
108 region of Mali 1,782,157 inhabitants in 1987, 2,625,919 inhabitants in 2009. The region of

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

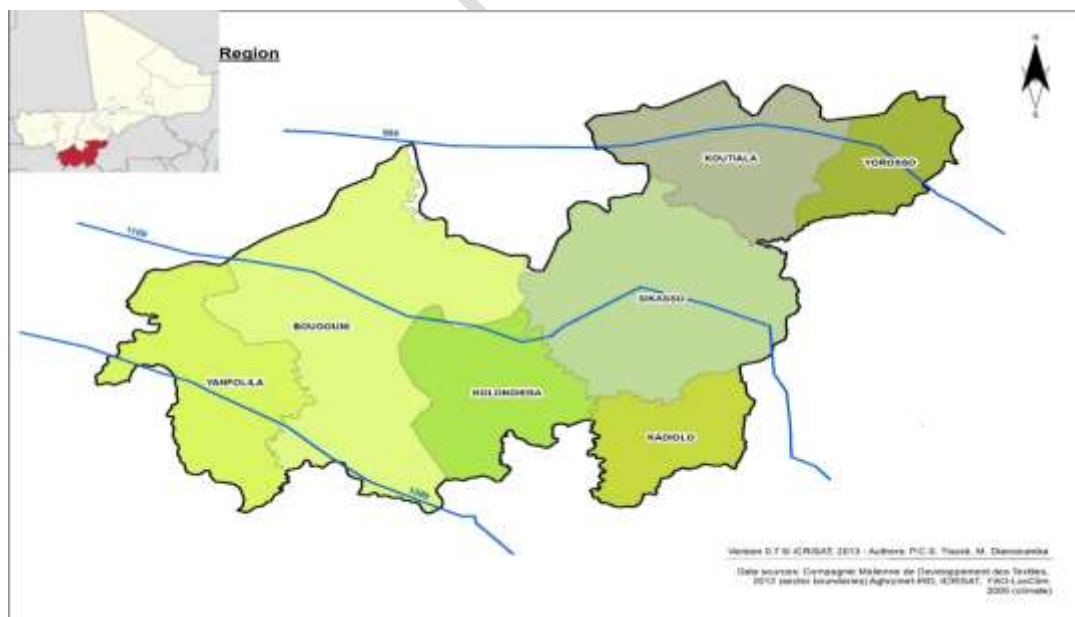
109 Sikasso is divided **into** seven (7) cercles (prefecture or department): Bougouni, Kadiolo,
110 Koutiala, Kolondièba, Sikassa, Yanfolila and Yorosso. Located in the southern part of the
111 country, it is the southern-most region of Mali, **it is located between** 11°11'59"N **and**
112 7°5'49"W. Sikasso region is at 375 **kilometers** from southeast of Bamako, the capital city,
113 borders the north of Côte d'Ivoire and the west of Burkina Faso. The region covers a total
114 area of 70,280 km² as density 37/km².

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

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

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

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



130

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

132 **Data**

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

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

154 **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

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

157 **Table 2 : Data distribution**

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

158

159 **Data analysis**

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

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

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

$$184 \quad P(y_i = j) = F_{ij}(X_{ij}'\beta), \quad i = 1, 2, \dots, N, \quad j = 0, 1, 2 \quad (1)$$

185 Where $P(y_i = j)$ is the probability that an individual i will migrate due to the reason, j .
 186 $P(y_i = 0)$, is computed when there are two probabilities. Therefore,

$$187 \quad \sum_{j=0}^2 P(y_i = j) = 1 \quad (2)$$

188 The multinomial logit model is given as

$$189 \quad P(y_i = j) = \frac{\exp(X_{ij}'\beta)}{\sum_{k=0}^2 \exp(X_{ij}'\beta)} \quad (3)$$

190 In this case, the log likelihood is specified by

$$191 \quad \ln L = \sum_{i=1}^N \sum_{j=0}^2 y_{ij} \ln P_{ij} \quad (4)$$

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

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

198 RESULTS AND DISCUSSION:

199 Descriptive characteristics of the sample

200 The characteristics of our sample carry out some of the most important characteristics of
201 the region of Sikasso. With a fine diversified ethnic group, Bambara represents 27.67% of
202 the sample, compared to the ethnic group Foulani (peulh), which corresponds to 26.33%.
203 The ethnic groups Mianka, Sénofou and Samoghos are some of the ethnic groups
204 dominant in this region, they represent respectively in this sample 18.66%, 10.67% and
205 10%. In fact, the remaining percentage of ethnic groups is sharing between Sarakolé, Dafi,
206 Bobo, Djonka and Gana.

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

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

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

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

226 respectively 3.13 hectares, 2.99 hectares and 1.29 hectares with respectively 2.218, 2.073
 227 and 0.809 tons as average yield.

228 **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)
<i>Ethnic group</i>		
Bambara	83	27.67
Peulh	79	26.33
Mianka	56	18.66
Sénoufo	32	10.67
Samogo	30	10
Other ethnic	20	6.67
<i>Main activity</i>		
Agriculture	200	66.67
Breeding	46	15.33
Trade	19	6.33
Public worker	14	4.67
Others main activity	21	7
<i>Crop production</i>		
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)

229

230 **Characteristics of the surveyed household**

231 **The surveyed households characteristics is presented in table 4.** The main activity of the
 232 household head of the sample is agriculture in the study site, which employs 66.67% of
 233 the total sample; this is in line with the reality in Mali, the agricultural sector employs over
 234 80% of the active population of Mali. Follow by breeding practice 15.33% of the whole
 235 sample and the other activities include civil work, homemaker, tailor, mechanic, drive,
 236 stonework and joiner. In more of doing a main activity, 60.67% of the household head
 237 practice a second activity, the reason for doing a second activity varies from one
 238 household head to another. The main reasons of doing second activity include: 37.91% say
 239 to raise the revenue to improve the life condition, 24.73% of those practicing secondary
 240 activity do it to prevent or to bear day-to-day expenditure of the family, such as 15.93%
 241 give as reason support the production of the season. There was 6.59 percent of the
 242 surveyed population practicing second activity to improve their living conditions, the

243 remains 15% is sharing between, overcome unexpected event, and practice by passion, by
 244 pleasure, to achieve the expensive of the condiments, revenue diversification and avoid
 245 unemployment.

246 **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 (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)

247 *Standard error in parentheses.*

248 **Characteristics of the migrants:**

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

255 Regarding the marital status of the migrants 61.82% of them are married and 36.55% are
 256 unmarried, only 1.64% which is the remain sharing between divorced and widowed
 257 migrants. Sikasso's region primary activity is based on agriculture why around 2/3
 258 (66.79%) of the migrants were employed in the agricultural sector before leaving their
 259 own place. **In breeding** and commerce activities, 10.40% were working in each of these
 260 sectors. **About destination of migrants, more than 60% move internally that is in line with**
 261 **the report of RGPH 2009. Average amount transfer by migrant to the family behind is**
 262 **142124.39 FCFA with a standard deviation of 151326.23.**

263 **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)

264 Migration causes

265 In table 6 reveals the distribution in percentage of the migrants by region of depart and by
266 reason of leaving. The intensity of leaving linked to the different reasons of migration
267 varies from place to place. These factors include economic, social aspect, professional,
268 politic, study and health. From the fourth general population and housing census of 2009,
269 most of the emigrants evoked that the economic reason is the main principal causes of the
270 out-migration in Mali (87.2%). There are other causes reveal by the migrants such as
271 social causes (9%), leave for studying (4.2%) and professional causes (2.4%). In all
272 regions, the economic cause is the first cause of migration in 2/3 in case, with the smallest
273 proportion in Bamako (62.3%), the highest proportion was recorded in Kayes' region
274 (92.9%). Household concern is the most cited in Gao's region (12.1%), Kidal's region
275 (11.7%) and for the district of Bamako (10.4%). The motive to study is high revealed by
276 Bamako's emigrants (19.6%) and the region of Kidal (10.2%).

277 **Table 6: Sharing (in %) of the emigrants, by region of depart and by motive of**
278 **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
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279 Source: RGPH 2009 our own calculation

280 **Drivers of migration in Mali**

281 This section analyzed the determinants of migration in the study area. From the survey,
 282 the push factors that lead to migration were classified under three major factors such as
 283 poverty or unemployment, environmental challenges, and others including curiosity,
 284 marriage and schooling. These primary and mutually exclusive factors force individuals to
 285 migrate to other locations. Therefore, a multinomial logic regression was estimated with
 286 the ‘other factors’ as the reference group. The objective in this section is to identify the
 287 socioeconomic characteristics of migrants based on the push factors. For instance, to
 288 identify the characteristics of people who migrant due to bad weather or environmental
 289 challenges. From the result, the factors that significantly influenced migration were sex,
 290 age, and age squared, household size, labour constraint, and location. The report of the
 291 research is in line with many previous studies on climate change induced such as [12, 13,
 292 14]

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

314 The effect of age on migration is negative while the effect of age squared is positive.
 315 However, the effect is significant for only migration due to environmental challenges. The
 316 negative effect of age and the positive sign of age-squared means that the younger farmers

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

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

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

358 underemployed. Environmental challenges also **require** that more labour is involved in the
 359 production of **the** crop since extra farm activities are supposed to be performed by the
 360 farmers. It is therefore not surprising that farmers who lack labour for crop production
 361 perceived that there is a higher probability of migrating due to poverty and environmental
 362 challenges.

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

385 **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						

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

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

389 Joint probability of push factors

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

401 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

402

403 Conclusion:

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

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