Internal Migrations and Health in Senegal: Healthy Migrant or Convergence Hypothesis

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RESEARCH ARTICLE

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ABSTRACT

Objective: The general objective of this study is to characterize the migrant population present in Dakar, and to test the existence in Senegal of the Healthy Migrant Hypothesis and the Convergence Hypothesis.

Methods: This study was carried out in 2015 on a population sample of 1000 individuals living in Dakar, constructed using the quota method. Socioeconomic and demographic characteristics, migratory status and self-rated health of individuals were collected during face-to-face interviews. Statistical analyses used were Chi-square tests and binary logistic regressions. Results: Show that internal migrants 40% of the study population. The migrant population is older than the Dakar population, and predominantly urban. Migration status, in terms of place of birth, is not associated to self-rated health. But residing in Dakar for at least 10 years significantly increases the risk of declaring oneself to be in poor health. Conclusion: The analysis showed that the geographical origin of individuals was not a determining variable in the analysis of the links between migration and health. But the duration of residence in Dakar offers better results. The Healthy Migrant Hypothesis does not apply to internal Senegalese migration. On the other hand, the health of migrants declines after 10 years of residence in Dakar, which follows the same logic as the convergence hypothesis.

INTRODUCTION

In the One Health concept, human health is eminently dependent on the physical and cultural environment of populations [1]. This is why the change of environment experienced by an individual during migration (whether internal or international) represents a unique experience for the study of interactions between health and the environment.

The multiplicity of factors involved in the relationship between migration and health is such that a number of explanatory hypotheses have been developed to structure the phenomena observed: healthy migrant hypothesis, salmon bias, socialization effect. [2]. These theories used to explain the relationships between migration and health have primarily been applied to international migration, particularly in

the United States [i.e., 3].

However, internal migration is quantitatively much more important than international migration, and the populations of sub-Saharan countries are among the most mobile [4]. This is why the objective of this study is to characterize internal migration to the Senegalese capital, Dakar, and to analyze the type of link between internal migration and health according to existing hypotheses.

Hypotheses on the relationships between migration and health

For many years, the relationships between migration and health have been studied, mainly taking into account the influence of the host environment on the health of migrants of foreign origin [i.e.

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5,6]. More recently, based on the observation that internal migration is much more prevalent than international migration, researchers have explored the relationship between internal migration and the health status of migrants, as well as the evolution of this relationship over time. Several explanatory hypotheses have emerged from the complex relationship between migration and health. The first, and most well-known, is the Healthy Migrant Hypothesis (or epidemiological paradox, or healthy migrant effect), which states that migrants are healthier than natives of the host environment, despite numerous disadvantages (economic, access to care...) [2]. Three factors seem to explain this situation [7]: first, possible pre-migration selection on the basis of health; the fact that migrants are less likely to report health problems; and finally, salmon bias (initially described in Abraído-Lanza and collaborators [3], and linked to unhealthy return migration [8]), i.e. the fact that many migrants choose to return to their place of origin when their health deteriorates, leaving only healthy individuals in the migrant population.

Other hypotheses relate to the change in health status of migrants as they are exposed in their host environment. This is for instance the case of convergence hypothesis (or assimilation hypothesis), which states that whatever the initial differences in health status between migrants and host population, these disappear over time and migrants end up with a health status comparable to that of the majority of the population [2,7,9]. This process could be explained by "negative acculturation" (i.e., the adoption of unhealthy behaviors more prevalent in the receiving society, [10]), also called adaptation effect. Apart from the various theories and hypotheses, it emerges from these studies that taking into account the time spent in the receiving environment is crucial in studying the links between migration and health. For example, Ginsburg and collaborators [11], in examining premature mortality among migrants in Sub-Saharan Africa (AIDS, tuberculosis and non-communicable diseases), show that migrant mortality is certainly more related to structural socio-economic constraints - access to health care, social integration, stress and migration-related behaviors - than to the epidemic dynamics of the health conditions studied. More than epidemiological dynamics, it is above all the social integration of migrants that seems to determine their state of health in the host environment. As this social integration necessarily evolves over time, it seems necessary to examine the health status of migrants as a function of the length of residence in their host environment.

Internal migrations and health

Demographic and socio-economic profile of internal migrants to Dakar

In Senegal, as in most countries, the major population flows pertain to individuals migrating within their own country [4,12]. In Senegal, nearly 2 million individuals, or 14.6% of the general population, are internal migrants [13]. Urbanization is currently in full expansion and is partly caused by internal migration from all parts of Senegal to Dakar's urban environment, essentially for economical reasons [14]. Indeed, the economic and social situation of the people of Dakar remains much more favourable than that of other Senegalese. Only 38 per cent of the former are illiterate compared to more than half of the latter (60.9 per cent) and 93.8 per cent of Dakar dwellings have access to electricity, a much lower percentage in other Senegalese regions (34.6 per cent) [15]. In addition, the people of Dakar spent 3,226 CFA francs per day (i.e. 5.33 US Dollars) on average in 2011; or nearly five times more than in rural areas (728 CFA francs per day, or 1.2 US Dollars) [16]. Regarding health, of the 22 hospitals in the country, 8 are located in Dakar, the capital. This is why today it can be said that with the increasing differentiation between urban and rural areas, migration to secondary towns and the capital has become a structural component of the demographic balance in Senegal, although the existence of migration to rural areas and circular migrations should not be ignored [17].

In addition to issues related to the occupation and development of densely populated areas in low and middle income countries, the demographic and socio-economic profile of the migrant population to Dakar is a determining factor in the integration opportunities offered to migrants once they arrive in urban areas. In 2009, a study made it possible to draw up a portrait of internal migrants in Dakar: the latter, mostly of rural origin, were older than the Dakar population. Migrants of urban origin differed from those of rural origin: younger and better educated, they were more likely than migrants of rural origin to migrate to Dakar in order to pursue higher education [14].

Since all the characteristics of the internal migrant population (age, gender, level of education, material well-being) are likely to have an effect on the health of migrants, it is therefore essential to be able to specify the current demographic and socio-economic structure of the migrant population and compare it with the native Dakar population.

Health in Senegal

In Senegal, life expectancy is 64.8 years [15], with a clear advantage in urban areas (67.4 years, compared with only 62.7 years in rural areas). At the same time, the adult mortality rate is also higher in rural areas (9‰) than in urban areas (6‰), and the causes of death are still mainly communicable diseases [18]. Maternal and child diseases, as well as malaria, remain for the moment the main concerns in national surveys [e.g. 19,20,21], even though chronic non-communicable diseases represent an increasingly significant proportion of overall mortality (42% in 2016 [18]).Finally, from the point of view of self-assessment of health, a recent study has shown that it is better in urban than in rural Senegal [22], and that the factors associated with it differ between the two settings.

While the distinction between rural and urban health status seems clear, the diversity of processes related to the relationship between migration and health (conceptualized through the healthy migrant hypothesis, convergence hypothesis, adaptation effect, salmon bias...) makes the study of the latter extremely complex [23]. Anglewicz and collaborators [24] also highlight the difficulty of establishing a causal link between migration and changes in health status. Analyzing the relationship between migration and health is all the more difficult as the components of health status studied are multiple: the results can thus differ according to the type of variable analyzed among migrants and their host or origin populations, for example chronic diseases [i.e, 25], communicable diseases [i.e., 26], mental health [i.e., 27] or self-rated health [i.e., 28].

Self-rated health is often preferred because studies have found it to have both constructs and criterion validity [29]. Research has documented that SRH has high reliability, validity, and predictive power for a variety of illnesses and conditions [30]. Above all, it has been found to be a valid measure of overall health status of a population [31] and a short- and long-term predictor of mortality in both developed [32] and developing countries [28,33]. Generally

speaking, self-rated health is better in urban areas than in rural areas in both developed countries [e.g., 34,35] and in developing countries [e.g., 36]. This can be explained by various favorable factors in cities, particularly socioeconomic factors. In urban areas, income is less irregular than in rural areas, and sanitation, preventive medicine and health care are all more available, particularly in Senegal [37]. Considering the fact that self-rated health has been described in urban and rural areas in Senegal, that it is a predictor of mortality in the short and long term and that it is often used in the analysis of the relationship between migration and health, we will therefore use it as a health indicator in this study.

OBJECTIVES

As Agyemang and colleagues [38] point out, migration represents a unique opportunity to study the influence of environmental exposure on health. Although a causal relationship cannot be established directly through these studies due to the complexity of the links between migration and health, many hypotheses and theories explaining the links between migration and health have been constructed. In Senegal, few studies address these relationships [25,39,40], and none allow defining the demographic and socio-economic profile of the migrant population to Dakar. This is why the general objective of this study is twofold: to characterize the migrant population present in Dakar (demography, socioeconomics and health status), and to test the existence in Senegal of two hypotheses related to the relationship between health and internal migration: the Healthy Migrant Hypothesis and the Convergence Hypothesis.

MATERIALS AND METHODS

Population sample

In order to carry out this study, a comprehensive survey was conducted from November to December 2015 in Dakar. The population sample selected for this study comprised 1 000 individuals age 20 and over. The sample was constructed using the combined quota method (cross-section by age, gender and town of residence) so that it would be representative of the population of the department of Dakar age 20 and over. Data from the Agence Nationale de la Statistique et de la Démographie dating from the last census (2013) were used. The quota variables used were gender (male/female), age (20-29 / 30-39 / 40-49 / 50 and over) and town of residence. The

towns were grouped by the four arrondissements of the department of Dakar: Plateau-Gorée (5 towns), Grand Dakar (6 towns), Parcelles Assainies (4 towns) and Almadies (4 towns). Practically, this method requires constructing a sample that reflects the proportions observed in the general population: for example, according to the last census, in the town of Medina (Plateau-Gorée arrondissement) 1.5% of the population were women age 20-29. The sample was constructed to match this proportion by including 15 women age 20-29 living in this town. The method was the same for each quota by gender, age and town.

In each town, four investigators (Ph.D. students in Medicine and Pharmacy) started out from different points each day to interview individuals in Wolof or French in every third home. Investigators had a certain number of individuals to interview (women aged 20-29 / men aged 20-29 / women aged 30-39 / men aged 30-39 / women aged 40-49 / men aged 40-49 / women aged 50 and over / men aged 50 and over, in each town) to meet the quotas. Only one person was selected as a respondent in each home. Investigators went to the house, asked about the inhabitants and then chose the first person they saw who met the characteristics needed for the quotas. In-person interviews were conducted. They ranged from 30 to 45 minutes, depending on respondent availability and desire to talk.

The objective of this study being to compare internal migrants and Dakar natives, individuals born abroad were withdrawn from the sample, resulting in a sample of 960 individuals.

Variables studied

Sociodemographic variables

The socioeconomic and demographic variables collected were:

- Age (20-29 /30-39 /40-49 /50 and over).

- Gender (male/female).

- Educational level – defined in accordance with the educational system in Senegal – (0/1-5/6-9/10-12/over 12 years of school).

- Economic conditions: the following question was used as an indicator of economic conditions: "Given your household income, do you feel you ... a) live well? b) live okay? c) live okay, but you have to be careful? d) have difficulty making ends meet?" This

question, taken directly from Razafindrakoto and Roubaud's study [41], has demonstrated validity and relevance in eight African capitals, including Dakar, to measure economic conditions in the context of subjective well-being.

- For migrants, length of residence in Dakar (< 10 years/< 20 years/≥ 20 years).

- Migratory status. Migrants were defined as individuals who were not born in Dakar and living there for more than one year. Two groups were distinguished among the migrant population: the first was made up of individuals born in an urban area (population of 10,000 inhabitants or more according to the GEOPOLIS); the second, of people who were born in towns having a population of less than 10,000 inhabitants and who could be considered rural. Urbanization being linked to health in sub-Saharan Africa, it was thus essential to distinguish between migrants from urban areas and those who come from truly rural areas, as self-rated health was likely to be higher in the former.

Health Variable

Self-rated Health was measured using a questionnaire with five possible answers: "Overall, would you say that your health is: excellent, very good, good, fair or poor?" For the majority of bivariate analyses and multivariate analyses, this variable was dichotomized. In accordance with Jylhä's [42] reflection showing a break between good health – "the baseline that does not normally need to have a cause" – and less than good health, the split was made between the answers "excellent," "very good," and "good" (scored 0) and the answers "fair" and "poor" (scored 1).

Statistical analyses

Files compiled on the basis of the questionnaires were processed and coded in Excel (2013). We used chi-square tests to measure the presence, strength, and independence of the statistical association of each sociodemographic variable, migratory status and length of residence in Dakar with self-rated health. We carried out binary logistic regression analysis to assess the relationship between self-rated health and migratory status or length of residence in Dakar by sociodemographic characteristics. All analyses were performed using SPSS software, version 20. A p-value < 0.05 was considered statistically significant.

Results

Migrant population: demography, socioeconomics and length of residence in Dakar

Our population sample, representative of the Dakar population, includes 40.5% migrants (people born outside the Dakar region). Of these, the majority (66.07%) were born in urban areas. As shown in Table 1, the native population of Dakar is significantly younger than the migrant population (over-representation of 20-39 year olds). Furthermore, migrants of urban or rural origin are over-represented among those with no education and those with a university degree.

The majority of migrants (44.73%) have been living in Dakar for more than 20 years. A comparison of the native population of Dakar and the migrant population according to time of residence in Dakar (Table 2) shows that migrants who have been in Dakar for more than 20 years are logically significantly older than other migrants, but also older than people born in Dakar. In general, migrants, regardless of their time of residence in Dakar, are significantly more likely to have no education, but migrants who have been present for less than 10 years have significantly more university education than the host population.

Finally, the distributions by gender and by level of material well-being do not differ between the migrant population and the Dakar population on the one hand, and within the migrant populations on the other (date of settlement in Dakar and place of origin).

Variables	Categories									Test
				Place of birth						
				Urban area		Rural area		Total		
		N	%	N	%	N	%	N	%	
Sex	Men	275	48,16	132	51,36	64	48,48	471	49,06	χ^2 : 0,747 ;
	Women	296	51,84	125	48,64	68	51,52	489	50,94	p = 0,688
Age brakets	20-29	247	43,26	108	42,02	48	36,36	403	41,98	χ^2 : 17,915 ;
	30-39	166	29,07	64	24,90	32	24,24	262	27,29	p = 0,006
	40-49	88	15,41	48	18,68	18	13,64	154	16,04	
	≥ 50	70	12,26	37	14,40	34	25,76	141	14,69	
Education level	0	75	13,13	69	26,85	51	38,64	195	20,31	χ^2 : 62,713 ;
	01-May	238	41,68	85	33,07	31	23,48	354	36,88	p < 0,001
	06-Sep	130	22,77	40	15,56	17	12,88	187	19,48	
	09-Dec	55	9,63	22	8,56	12	9,09	89	9,27	
	> 12	73	12,78	41	15,95	21	15,91	135	14,06	

Economic well-being	Have difficulty making ends meet	61	10,68	32	12,45	14	10,61	107	11,15	χ² : 8,365 ;
	Live ok but have to be careful	86	15,06	44	17,12	25	18,94	155	16,15	p = 0,213
	Live ok	312	54,64	141	54,86	79	59,85	532	55,42	
	Live well	112	19,61	40	15,56	14	10,61	166	17,29	
Total		571	100,00	257	100,00	132	100,00	960	100,00	

Table 1: Demographic, socioeconomic and psychological variables by place of birth (N = 960)

Variables	Categories	Length of residence in Dakar									Test
		< 10 years		10-19 years		≥ 20 years		Born in Dakar		Total	
		71	58,68	40	42,55	85	48,85	275	48,16	471	49,06	χ² 6,259 ; p = 0,100
Sex	Men	50	41,32	54	57,45	89	51,15	296	51,84	489	50,94	
	Women	91	75,21	46	48,94	19	10,92	247	43,26	403	41,98	χ² 196,010 ; p < 0,001
Age brackets	20-29	21	17,36	36	38,30	39	22,41	166	29,07	262	27,29	
	30-39	4	3,31	9	9,57	53	30,46	88	15,41	154	16,04	
	40-49	5	4,13	3	3,19	63	36,21	70	12,26	141	14,69	
	≥ 50	30	24,79	24	25,53	66	37,93	75	13,13	195	20,31	χ² 93,533 ; p < 0,001
Education level	0	31	25,62	37	39,36	48	27,59	238	41,68	354	36,88	
	01-May	18	14,88	8	8,51	31	17,82	130	22,77	187	19,48	
	06-Sep	7	5,79	13	13,83	14	8,05	55	9,63	89	9,27	
	09-Dec	35	28,93	12	12,77	15	8,62	73	12,78	135	14,06	
	≥ 12	12	9,92	11	11,70	23	13,22	61	10,68	107	11,15	

Ma-terial well-being	Have difficul-tymaking ends meet	17	14,05	15	15,96	37	21,26	86	15,06	155	16,15	χ² 10,272; p = 0,329
	Live ok but haveto be careful	74	61,16	54	57,45	92	52,87	312	54,64	532	55,42	
	Live ok	18	14,88	14	14,89	22	12,64	112	19,61	166	17,29	
	Live well	112	19,61	40	15,56	14	10,61	166	17,29			
Total		121	100,00	94	100,00	174	100,00	571	100,00	960	100,00	

Table 2: Demographic, socioeconomic and psychological variables by length of residence in Dakar (N = 389

Variables	Categories	Self-Rated Health						Test
		Bad		Good		Total		
		N	%	N	%	N	%	
Sex	Men	113	38,83	358	53,51	471	49,06	χ² : 0,747 ;
	Women	178	61,17	311	46,49	489	50,94	p = 0,688
Age brakets	20-29	100	34,36	303	45,29	403	41,98	χ² : 17,915 ;
	30-39	67	23,02	195	29,15	262	27,29	p = 0,006
	40-49	60	20,62	94	14,05	154	16,04	
	≥ 50	64	21,99	77	11,51	141	14,69	
Education level	0	70	24,05	125	18,68	195	20,31	χ² : 62,713 ;
	01-May	111	38,14	243	36,32	354	36,88	p < 0,001
	06-Sep	59	20,27	128	19,13	187	19,48	
	09-Dec	22	7,56	67	10,01	89	9,27	
	> 12	29	9,97	106	15,84	135	14,06	

Economic well-being	Have difficulty making ends meet	52	17,87	55	8,22	107	11,15	χ^2 : 8,365 ;
	Live ok but have to be careful	47	16,15	108	16,14	155	16,15	p = 0,213
	Live ok	149	51,20	383	57,25	532	55,42	
	Live well	43	14,78	123	18,39	166	17,29	
Place of birth	Dakar	151	51,89	420	62,78	571	59,48	χ^2 10,646 ; p = 0,005
	Urban area	96	32,99	161	24,07	257	26,77	
	Rural area	44	15,12	88	13,15	132	13,75	
Length of residence in Dakar	< 10 years	36	12,37	85	12,71	121	12,60	χ^2 14,769 ; p = 0,002
	10-19 years	32	11,00	62	9,27	94	9,79	
	≥ 20 years	72	24,74	102	15,25	174	18,13	
		151	51,89	420	62,78	571	59,48	
Total		291	100,00	669	100,00	960	100,00	

Table 3: Demographic, socioeconomic, psychological and migration variables by self-rated health (N = 960

Self-rated health

The results obtained in bivariate analyses (Table 3) show that women, people over 40 years of age, people with less than secondary education and people having difficulty in everyday living are over-represented among individuals reporting poor self-rated health.

Furthermore, migrants (from both urban and rural areas) are significantly more likely to consider themselves to be in poor health than people of Dakar origin, as are migrants who have been living in Dakar for 10 years or more.

In the bivariate analyses, it thus appeared that age and education level were associated with length of residence in Dakar (Table 2), and that migratory, demographic and socio-economic variables were related to self-assessed health (Table 3). A logistic regression was therefore carried out in order to control for the association between self-rated health and migration by all other variables. The results obtained showed that self-rated health is related to gender and age: women and individuals over 40 years of age are significantly more likely to have a negative health assessment. From a socio-economic point of view, individuals who report having difficulty in everyday living are significantly more likely to report poor self-rated health. In our Dakar sample, the level of education is not related to self-rated health.

Finally, concerning the migratory status strictly speaking, it appears that the place of birth of migrants does not play a role in the relationship to self-rated health when all demographic and socio-economic variables are taken into account. On the other hand, the fact of residing in Dakar for at least 10 years significantly increases the risk of declaring oneself to be in poor health, whatever the age, sex, level of education and material well-being of the migrants.

	Categories	p	Odds Ratios	CI for OR (95%)			p	Odds Ratios	CI for OR (95%)		
Sex (Men)	Women	< 0.001***	1,950	1,450	-	2,621	< 0.001***	1,941	1,443	-	2,611
Age bracket (≥ 50 years)	20-29 years	< 0.001***	0,435	0,283	-	,668	< 0.001***	0,439	0,277	-	0,696
	30-39 years	< 0.001***	0,408	0,260	-	,640	< 0.001***	0,411	0,259	-	0,653
	40-49 years	0,220	0,739	0,456	-	1,198	0,253	0,755	0,467	-	1,223
Education level (> 12 years)	0 year	0,437	1,244	0,718	-	2,157	0,459	1,231	0,710	-	2,134
	1-5 years	0,190	1,395	0,848	-	2,295	0,180	1,406	0,854	-	2,315
	6-9 years	0,152	1,484	0,865	-	2,548	0,144	1,496	0,871	-	2,569
	9-12 years	0,897	1,044	0,543	-	2,009	0,907	1,040	0,539	-	2,007
Material well-being (Live well)	Have difficulty making ends meet	0,002**	2,339	1,353	-	4,043	0,002**	2,326	1,346	-	4,019
	Live ok but have to be careful	0,796	1,071	0,638	-	1,798	0,827	1,059	0,632	-	1,777
	Live ok	0,941	1,016	0,671	-	1,538	0,984	1,004	0,664	-	1,519
Place of birth (Rural area)	Dakar	0,210	0,755	0,487	-	1,171					
	Urban area	0,288	1,287	0,808	-	2,049					
Length of residence (Born in Dakar)	< 10 years						0,058	1,573	0,984	-	2,513
	10-19 years						0,048*	1,638	1,004	-	2,670
							0,032*	1,541	1,037	-	2,290
*** p< 0.001 ** p < 0.005 * p < 0.05											

Table 4: Adjusted odds ratio (OR) for poor self-rated health in Dakar (N=960)

Discussion

Current state of internal migration to the Dakar urban area

Within our sample of population representative of the population of the department of Dakar, the proportion of migrants is significant (40.5% of the sample). Compared to a study dating from 2012 [40], it appears that the proportion of migrants in the Dakar population is relatively lower (it goes from 45% to 40%), a result consistent with the observations of the last Senegalese census [15]. In contrast, as in 2012, there is no difference in terms of gender distribution between the native Dakar population and migrant populations, which confirms the fact that female migration in Senegal is now well established in practice.

Moreover, while migrants are still older than the Dakar population, the proportion of young migrants of rural origin has increased (among rural migrants, the proportion of 20-29 year olds has risen by 10%). Moreover, the origin of migrants has changed since 2012, with the majority of migrants in Dakar now coming from urban areas. This change in the profile of the migrant population heading for Dakar is major: according to Pélissier [43], the urban environment (and in particular secondary towns), due to the significant growth it is experiencing, is an agent of diffusion of urban models, modernization but also standardization. Located at the crossroads of commercial exchanges, secondary cities have become the heart of circular migration and animate the links between rural and urban areas. Moreover, the spread of the urban model in secondary cities suggests that the lifestyles adopted in these cities could influence the health of the individuals who live there.

At the same time, the profile of migrants in terms of educational attainment has also changed. In 2012, many migrants had no education at all and very few attend (or had attended) university. This trend has changed: although migrants are still over-represented among those with no education compared to native Dakarites, the imbalance is much smaller than in 2012 and is mainly due to the increase in the level of education of migrants from rural areas. Among the latter, 46% had no education in 2012, compared to only 38.64% in our population sample. Even if migrants from rural origin are no longer in the majority, it seems that a new trend bringing migrants from rural origin with a high level of education to the capital is under construction.

Thus, two cases coexist: on the one hand, and in a rather classic way, migrants with a low level of education come to Dakar with the aim of integrating into an economic environment offering more opportunities than in the rest of the country. And on the other hand, migrants, who have been settled for less than 10 years, younger and better educated than the others, who come to the capital of the country in order to pursue their studies in higher education.

Relationship between health and internal migration

According to bivariate analyses, self-rated health is, on the whole, worse among migrants (urban and rural). Considering only these results, the "Healthy Migrant Hypothesis" would then not be applicable to internal migration in Dakar, as migrants are not healthier than their host population. However, it must be noted that migrants are on average older than the native population of Dakar, and that this factor may explain the fact that migrants consider themselves to be in worse health, since health is of course linked to age. Thus, in order to verify that there is no relationship between variables that interfere with the studied relationship between self-rated health and migratory variables, a logistic regression was carried out. This regression showed that, all other things being equal, the self-rated health of migrants and native Dakarites does not differ when the migrant status is defined by place of birth (rural, urban). Thus, demographic and socio-economic variables alone explain the differences observed in the bivariate analyses between natives of Dakar, migrants of rural origin and migrants of urban origin. This means that women, people over 40 years of age and those who report living with difficulties are more likely to report poor health, whether they are natives of Dakar, migrants from urban or rural areas. Migration status, in terms of place of birth, is therefore not relevant in the analysis of the relationship between migration and health.

However, when we consider not the place of birth but the duration of exposure to the host environment (Dakar, in this case), a relationship can be observed between health and migration. All other things being equal, the self-rated health of natives of Dakar is comparable to that of migrants who have been settled for less than 10 years, but migrants who have been settled for more than 10 years are significantly more likely to report poor health than natives of Dakar. In this context, the

Healthy Migrant Hypothesis is inoperative, since there is no significant difference between the self-rated health of natives of Dakar and recent migrants (< 10 years of residence in Dakar). Thus, and as in South Africa [44] or Pakistan [27], it appears that internal migrants (regardless of their rural or urban origin) do not exhibit a health advantage, making the Healthy Migrant Hypothesis unable to account for the health status of internal migrants in Senegal, whereas it is generally observed in the context of international migration.

Moreover, the initial health status of migrants deteriorates as they are exposed to the urban environment of Dakar. This deterioration of health status as exposure to the host environment may correspond to the Convergence Hypothesis, explained by the fact that the longer they live in the host city, the more likely migrants adopt an urban lifestyle, which can have an adverse effect on their physical health status [7,45]. However, in our study, internal migrants do not have any health advantage at the time of their settlement, so the only certainty is that a decline in the initial health status of migrants exists, whether or not this health status is better than that of the host population. This decline in health status among migrants is observed regardless of age, gender, education or material well-being. Apparently, therefore, socio-economic integration is not the primary factor linked to the deterioration of this health status. On the other hand, as highlighted and analyzed by many authors [2,46], migration is also a psychologically stressful experience, due to the discrepancy sometimes observed between expectations related to migration and reality once settled. According to Chen and colleagues [27]: "At the same time, migrants lose communal ties, thus weakening them socially. In a society where kinship networks are critical and determine choice of occupation, marriage, and personal security, migration can thus be extremely disruptive." In Senegalese society, where social support and social relations play a major role in assessing the quality of life of individuals [47], it is therefore quite possible that the decrease or loss of social support among migrants induces stress, which in turn could negatively influence, after a few years, self-rated health.

A few study limitations need to be noted. First, the study indicates that the health of migrants is associated with their length of stay in Dakar. Drawing causal inferences from cross-sectional study is difficult and must be done with extreme caution. Further studies are necessary to collect longitudinal data. Furthermore, this study provided no information about the health status of respondents before they entered the observation period. Future studies need to be carried out in order to identify health trajectories of migrants over time, taking into account their initial state of health.

CONCLUSION

This paper aimed to examine the relationship between internal migration and health in Senegal, through the testing of two hypotheses widely used in this type of study: the Healthy Migrant Hypothesis and the Convergence Hypothesis. First, it appeared that the profile of the migrant population to the capital, Dakar, has changed since 2009. The migrant population is older than the Dakar population, but is getting younger. It is now predominantly urban and its level of education is increasing (especially among migrants from rural areas). These characteristics are likely to influence the health status of the migrant population and have therefore been taken into account when analyzing the links between health and migration. The analysis showed that the geographical origin of individuals (rural or urban) was not a determining variable in the analysis of the links between migration and health. On the other hand, the duration of residence in Dakar (i.e. the duration of exposure to the host environment) offers better results. Initially, the self-assessment of the health of migrants and native Dakarites is comparable. The Healthy Migrant Hypothesis therefore does not apply to internal Senegalese migration. Moreover, after 10 years of residence in Dakar, and regardless of age, gender, material well-being and education level, migrants' health declines. This result, although following the same logic as the Convergence Hypothesis, does not support it, since the health status of migrants does not match that of the host population. On the contrary, migrants are in poorer health than native Dakarites. It is now necessary to conduct studies to assess the health status of migrants before their departure to Dakar, and to analyze the socio-psychological determinants of the deterioration of migrants' health status after 10 years of residence in Dakar.

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