Effects of Migration on Perceived Health Status in Brazil's Southeast and Midwest Regions

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Abstract: *The present article aims to analyze the effects of migration on the health status reported by individuals who migrated to Brazil's Midwest and Southeast regions. It also aims to ascertain the significance of a migrant's origin in determining the health status reported and whether the years of residence in the region of destination affect this status. The Pseudo-Panel technique is applied by means of a Pooled Ordered Probit model, with the self-declared health status of individuals as the dependent variable. Data were obtained from the National Household Sample Survey (PNAD) for the years 1998, 2003 and 2008. The results show that migrants residing in the Southeast tended to declare a health status that was inferior to that of native-born residents, whereas no statistical significance was observed in the Midwest.*

Keywords: *Internal migration, health status. Brazil, pseudo-panel, probit.*
Clasificación JEL: I12, R10.

Efectos de la migración en el estado de salud percibido en las regiones del sureste y centro oeste de Brasil

Resumen: *El presente artículo tiene como objetivo analizar los efectos de la migración en el estado de salud autoreferido por individuos que migraron a las regiones del sureste y centro oeste de Brasil. También, se busca descubrir si el origen del migrante respectivo es de mayor importancia para determinar el estado de salud autoreferido y si los años de residencia en la región de destino lo afectan. Se utiliza la técnica de pseudo-panel mediante un modelo Probit ordenado Pooled, donde la variable dependiente es el estado de salud autodeclarado de los individuos. Los datos se obtuvieron de la Encuesta Nacional por Muestreo de Domicilios (PNAD) para los años 1998, 2003 y 2008. Los resultados muestran que los migrantes que viven en el Sureste tendieron a declarar un estado de salud peor que el de los residentes nativos, mientras que en el centro oeste no hubo significación estadística.*

Palabras clave: *migración interna, estado de salud, brasil, pseudo-panel, probit.*

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Effets De La Migration Sur L'état De Santé Perçu Dans Les Régions Du Sud-Est Et Du Centre-Ouest Du Brésil

Résumé: *La présente étude vise à analyser les effets de la migration sur l'état de santé déclaré par les personnes ayant migré vers les régions du Sud-Est et du Centre-Ouest du Brésil. Elle vise également à déterminer si l'origine du migrant respectif est d'une importance majeure pour déterminer l'état de santé déclaré et si les années de résidence dans la région de destination l'affectent. La technique de pseudo-panneau est utilisée au moyen d'un modèle Probit ordonné groupé, où la variable dépendante est l'état de santé autodéclaré des individus. Les données proviennent de l'Enquête nationale par sondage auprès des ménages (PNAD) pour les années 1998, 2003 et 2008. Les résultats montrent que les migrants vivant dans le Sud-Est ont tendance à déclarer un état de santé plus mauvais que celui des résidents natifs, alors que dans le Centre-Ouest, il n'y a pas de signification statistique.*

Mots-clés: *migration interne, état de santé, brésil, pseudo-panel, probit.*

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Introduction

The decision to migrate involves a considerable number of determinants, such as economic, social and environmental factors. However, when migrating and after a certain post-migration period, individuals may encounter challenges in adjusting to the new environment due to the process of acculturation, influenced by the above-mentioned social, economic and environmental conditions of the destination (Head *et al.*, 1993; Nair *et al.*, 1990; Singh & Siahpush, 2001).

One of the major difficulties faced by migrants has to do with their health status. A worsening in the health status of individuals adversely affects economic productivity, as health is one of the constituent factors of any country's stock of human capital[1] (Schultz, 1961).

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[1] Human capital consists of the skills and capacities individuals possess and, akin to investment in capital goods, enhances economic productivity of the economy (Schultz, 1961).

In Brazil, as in the rest of the world, migratory flows are constantly changing. At present, the destinations of Brazil's internal migratory flows are the Southeast and Midwest. The former has become more appealing due to its heightened industrial development, which increases the search for jobs and better living conditions. Even though the Southeast remains a major receiver of migrants, there is an intense parallel flow to the Midwest, which has been expanding its economy and increasing job opportunities (Nunes *et al.,* 2017).

In this respect, the Midwest and Southeast have collectively received approximately 2 million migrants (IBGE, 2000). For decades, these regions have been major receivers of migrants in search of new opportunities, yet they exhibit distinct characteristics, particularly in the health sector. A study by Travassos *et al.* (2006) highlighted disparities between the aforementioned regions in terms of access to health services. In the Midwest, people with higher incomes have greater access to health services than those with less purchasing power, whereas there is no significant difference in the Southeast.

The aforementioned changes in the destination of Brazilian migrants occur alongside the change in migrant profile[2]. Their health status, conditional on migration, depends on the period analyzed, the region of origin, and the conditions found in the region of destination.

Another factor to consider when analyzing the relationship between migration and health status is the duration of an individual's residence at their destination. Authors such as Van Steenbergen *et al.* (1999), McCredie *et al.* (1999), and Deb and Gurevich (2017) note that a migrant's health status evolves with time spent in the new location and can either improve or deteriorate. Thus, analyses that take the migrant's years of residence into account can highlight relevant factors affecting the relationship between migration and health status.

In view of the aspects considered, studies already carried out on the relationship between migration and health status yield varying results. A study by Bhugra (2004) examines the impact of migration on mental health

[2] It refers to personal characteristics, such as ethnicity, gender, migrations with family members or as individuals etc. Nascimento *et al.* (2017), for example, note that there was a considerable increase in the number of migrant women in recent years.

and observes that the demographic characteristics of a migrant's origin and destination influence their acculturation and may impact their health status. In this vein, several authors have shown the adverse effects of migration on health status, indicating an increased likelihood of chronic diseases affecting migrants (Barbone *et al.*, 1996; Deb & Gurevich, 2017; Ebrahim *et al.*, 2010; Fascioli *et al.*, 1995; Wild & Mckeigue, 1997).

In addition, studies such as those carried out by Bennett (1993), Gustafsson (2018), Mavreas and Bebbington (1988), and Singh and Siahpush (2001) indicated no definitive evidence that migration was related to an individual's health status. Personal characteristics, place of origin, and way of life are fundamental to explaining migrants' health status and the diseases they may have contracted. However, migration had minimal or no relation to their health condition.

Considering the aforementioned factors and the nascent state of national literature on the subject, the present study aims to examine the relationship between migration and health in the two main migrant-receiving regions, the Southeast and Midwest. Specifically, the objective is to verify the impact of migration on people's health status and assess whether the time spent by the migrant in the destination intensifies or mitigates the possible effect of migration on health conditions and whether a migrant's origin can affect the relationship between migration and health status.

As already pointed out, the present study contributes to the literature on the subject, as its results will facilitate the implementation of public policies leading to improved health status in the population, particularly migrants in the regions identified as destinations.

I. Empirical Evidence on the Relationship between Migration and Health Status

The determinants of migration and the experiences lived throughout the entire migration process are numerous and vary according to the migrant's profile. In this respect, their health status may be affected by the conditions they have encountered, such as the quality of their transfer, access to essential health services at both their place of origin and destination, as

well as their socioeconomic situation. Thus, behavioral factors, physical health, and biological factors—including the incidence of specific diseases in particular areas, the distance traveled, climatic conditions, and access to health services—can all impact the health status of migrants (Davies *et al.*, 2006; Gushulak & Macpherson, 2006).

There is, therefore, a range of factors involved in the complex relationship between migration and self-reported health status (Davies *et al.*, 2006). In addition, other characteristics, such as age, income and schooling also impact the health status of individuals and their self-assessment (Kaleta *et al.*, 2009).

In this regard, the studies addressing this relationship offer diverse perspectives by discussing issues ranging from the effects of migration on people's physical and mental health status to their socioeconomic milieu, employing various methodologies to measure health. The literature on this topic is well-established, with international research being more extensive than the national one. Thus, studies addressing this relationship in different countries, including Brazil, are presented.

The international literature has extensively explored the relationship between migration and self-reported health across various contexts and time periods, employing a range of empirical strategies. Many of these studies have found evidence suggesting that individuals experience a decline in their health, whether mental or physical, following migration. For instance, Fascioli *et al.* (1995) discovered that Italian internal migrants exhibited a higher cancer mortality rate than non-migrants. Similarly, Salmond *et al.* (1985) showed that the New Zealand migrant population tended to have higher blood pressure than the native-born population, which could have triggered the onset of heart disease. Similar results were reported by Green *et al.* (2015).

However, not all studies in the international literature support these findings. For instance, Mavreas and Bebbington (1988) conducted a study to determine whether migration influenced the occurrence of psychiatric disorders among Greeks who migrated to London. They compared this group with a non-migratory population-based sample of Greeks and concluded that migration could not be considered a contributing factor to the onset of mental disorders in the studied group. Overall, the variability

in results suggests that the impact of migration on health outcomes depends on several factors, including the migrant's region of origin, destination and duration of residence.

In this connection, Halli and Ancham (2005) found that immigrants residing in Canada for over ten years exhibited worse health statuses than the most recent arrivals. Kearns *et al.* (2017) identified three possible explanations for the deterioration of migrants' health over time. Firstly, the process of acculturation may lead migrants to adopt unhealthy habits in their new environment. Secondly, the living and working conditions encountered at the destination, including housing and employment, may contribute to the development of illnesses. Finally, age could also play a role, as individuals' physical health tends to deteriorate with age.

Additionally, it must be noted that the bidirectional relationship between migration and health status is another factor that may affect the results. While migration can influence the health status of an individual, an individual's health status can also influence their likelihood of migrating. Certain studies indicate a healthy migratory effect, suggesting that only healthy individuals migrate. Nagi and Haavio-Mannila (1980) analyzed the health status of immigrants, internal migrants, and non-migrants, based on a probabilistic sample of the United States population. The authors discovered that immigrants had better physical and mental health conditions, followed by internal migrants, and, finally, by non-migrants.

Along the same lines, Norman *et al.* (2005) used a population sample from microdata of the 1971, 1981 and 1991 Population Censuses for England and Wales, considering the socioeconomic and geographical conditions of migration and found that the largest migrant contingent was made up of 20 to 59-year-old healthy individuals. Their study analyzed the regions of origin and destination, revealing that the migrant's destination had an impact on their health status. It was observed that migrants in the poorest regions were generally less healthy than those who migrated to regions with higher income levels.

Although the national literature is significantly less extensive compared to international research, studies on migration in Brazil do address some of the

previously mentioned aspects. Kang *et al.* (2009) examined the health status of individuals in a Korean community in the city of São Paulo and found that these migrants experienced a higher incidence of psychiatric disorders than Koreans who were still living in Korea. Silveira *et al.* (2013) analyzed Bolivian immigrants in the municipality of São Paulo and discovered that they have difficulties in accessing health services and in acquiring health insurance. The proportion of Bolivians who possess health insurance is negligible when compared to that of Brazilians. These studies indicate a negative impact of migration on health.

Similarly, Leão *et al.* (2017) investigated the health status and working conditions of Haitian immigrants in the municipalities of Cuiabá and Várzea Grande in the state of Mato Grosso. They observed that these migrants are at risk of accidents and experience physical and psychosocial issues resulting from their working conditions. Alves *et al.* (2019) analyzed how the above-mentioned Haitian immigrants accessed health services and observed an increase in demand for these services as the years of residence in Brazil increased. This could reflect a better understanding of how the system functions.

Conversely, Tsugane *et al.* (1989) analyzed the mortality rates of Japanese immigrants in São Paulo and noted that they exhibited lower mortality rates than those of Brazilians or Japanese individuals who were still residing in Japan. However, when mortality types were compared, those associated with ischemic heart disease and diabetes were significantly higher in São Paulo than in Japan. This indicates that acculturation, frequently involving a new diet and customs, is a key factor in this result. The authors emphasize that the mortality rate may have been impacted by the fact that the migrant arrives at their destination in good health.

Regarding Brazilian internal migration, Oliveira (2014) studied the effects of migration on health status using data from the 2008 National Household Sample Survey (PNAD). By means of a probabilistic model, the author demonstrated a significant probability of migration affecting health for females, while no statistical significance was observed for males.

Overall, it has been concluded that migration can impact people's physical and mental health states. Some studies identified positive effects associated with the adoption of healthier habits and increased access to health services. On the other hand, additional research has demonstrated it had negative effects on the health status of migrants, as they encounter challenges in adapting to their new place of residence and accessing essential resources for survival, such as housing and employment.

II. Methodology

Migration-induced population mobility highlights the disparities between migrants' origins and destinations regarding determinants of individual health status (Gushulak; Macpherson, 2006). The present study aims to elucidate the relationship between migration and health status in Brazil by examining individuals over time.

To track individuals longitudinally, cohorts by year of birth, similar to those used in a pseudo panel, must be established. In this case, however, individual values are employed rather than the mean of these cohorts, and dummies are created for each, thus allowing for the monitoring of individuals over time. The dataset comprises individuals born between 1948 and 1981, with 17 dummies established to represent their birth years.

Given the structure of the data available, the Pooled method was used, which enables the stacking of data from the different time units analyzed, assuming that the observations are independent and that the distribution may not be identical over the years. In addition, variables that are considered fixed over time can be controlled through dummies and thus were included to represent the years analyzed (Wooldridge, 2010).

Considering that the dependent variable is of the discrete and ordered type, the ordered Probit model was used in this research. Wooldridge (2010) discussed the estimation of models with discrete variables in the panel. In the case of the ordered Probit, estimation is possible, assuming that the explanatory variables are exogenous and that the error is normally distributed. In this model, the parameters are estimated by maximum likelihood, thus

guaranteeing the consistency of the estimators. Moreover, there is no constant term, as the sum of the cut points, which are the limit values at which individuals move from one category to another, is equal to one. To evaluate the goodness of fit, a Wald test was performed for the estimated models to test the null hypothesis that all coefficients, except for the constant or thresholds, are zero.

The dependent variable is the self-declared individual health status, categorized as follows: 0 - very poor; 1 - poor; 2 - fair; 3 - good and 4 - very good. Although self-reported variables can lead to overestimation or underestimation of the results, Dachs (2002), Theme Filha *et al.* (2008) and Simão Filho *et al.* (2018) consider that qualitative and subjective health variables are reliable indicators of an individual's health status. In this respect, Simão Filho *et al.* (2018) assert that the self-declaration of health depends on various individual characteristics, such as income, ethnicity, schooling and age, as well as the individual's milieu and the availability and accessibility of health services.

In accordance with the literature, alongside the previously mentioned dummies, information on individual characteristics is incorporated, such as schooling level (*schooling 1*, . . ., 4: indicating a range from illiterate to higher education), color (*color*: white or non-white), sex (*sex*: female or male), per capita income (*income per capita*), presence of chronic disease (*chronic disease*); and housing information (*location*: urban or rural residence) and sewage (*Sewage*: access or lack of access to a sewage network). To meet these objectives, dummies were created to represent the migrants' years of residence (*Migrants 5*: migrants with 5 to 9 years' residence, and *Migrants 10*: migrants with more than 10 years' residence). Dummies were also created to denote the migrant's region of origin[3]. Thus, the estimated model is expressed as follows:

[3] Brazil is divided into five macro-regions: South, Southeast, Midwest, North and Northeast.

$$\begin{aligned} healthstatus_i = {} & \beta_1 migrant_i + \beta_2 schooling\ 2_i + \beta_3 schooling\ 3_i \\ & + \beta_4 schooling\ 4_i + \beta_5 color_i + \beta_6 sex_i \\ & + \beta_7 income\ per\ capita_i + \beta_8 chronic\ disease_{dis_i} \\ & + \beta_9 location_i + \beta_{10} sewage_i \\ & + \beta_{11} migrants\ 10_i + \beta_{12} year3_i \\ & + \beta_{13} year8_i + origin_{nit}\beta + CO_{jit}\beta + \varepsilon_i \end{aligned} \tag{1}$$

where *year* represents the dummies for the years used, with 1998 as the baseline; *origin* is a vector that represents the migrant's origins, with subscript n as the identifier of each origin; and CO denotes the dummies for the years of birth, where $j = 1, \ldots, 17$. Subscript i corresponds to the individuals who are analyzed over time t, specifically the years 1998, 2003 and 2008. The dependent variable assumes the following values:

$$healthstatus^i = 0\ if - \infty < y^i \leq \mu_0 \tag{2}$$

$$healthstatus^i = 1\ if \mu_0 < y^i \leq \mu_1 \tag{3}$$

$$healthstatus^i = 2\ if \mu_1 < y^i \leq \mu_2 \tag{4}$$

$$healthstatus^i = 3\ if \mu_2 < y^i \leq \mu_3 \tag{5}$$

$$healthstatus^i = 4\ if \mu_3 < y^i \leq +\infty \tag{6}$$

where μ_i, the *cut points*, represent the limit values at which an individual moves from one category to another. Scenarios are then created to determine the probability of a particular individual declaring their health status. Accordingly, two baseline scenarios were created, one for the native-born individual and another for the migrant, based on the characteristics of the sample mean. In addition to these, five other scenarios are created, each incorporating one different characteristic from the baseline scenario. In total, seven scenarios were included, four to analyze the migrant and three to analyze the native-born. The scenarios were analyzed for the two destinations being studied, the Midwest and the Southeast.

It must also be mentioned that the variable denoting the individual as a migrant considered whether they no longer lived in their region of birth and

had been living for at least five years at their destination (Caiado, 2005; Cunha, 2005; Loureiro, 2018). The migration analysis was conducted in relation to the Brazilian macro-regions of the South, Southeast, Midwest, Northeast and North. Thus, the migrant is defined as an individual born in one of the Brazilian macro-regions who has lived in the Southeast or Midwest for a minimum of 5 years. Individuals who migrated to regions other than those analyzed, namely the South, North and Northeast, were excluded from the sample, as were those who never migrated, with the exception of individuals from the Southeast and Midwest, who are the focus of this research.

Table 1 presents the variables used in the estimations of econometric models, which were selected based on the literature, along with their expected signs.

Table 1. *Variables to be used in the estimations of econometric models*

Variable	Description	Expected sign
health status	Dummy variable representing individuals' health status with the following categorization: 0 - very poor; 1 - poor; 2 - fair; 3 - good; and 4 - very good.	Dependent variable.
migrant	Dummy variable that identifies whether individuals are migrants, with a value of 1 if they are migrants and 0 otherwise.	Sign to be empirically verified. As observed in the literature, there is no consensus regarding the effect of migration on health status.
schooling 1	Dummy variable indicating whether the individual is illiterate or has incomplete primary education, with a value of 1 if true, and 0 otherwise.	Oliveira (2014) found that education level is positively related to health status. Therefore, the expected sign is positive and increasing.
schooling 2	Dummy variable indicating whether the individual is illiterate or has incomplete elementary education, with a value of 1 if true and 0 otherwise.	

Continued

Table 1. *Continuation*

Variable	Description	Expected sign
schooling 3	Dummy variable indicating whether the individual has completed high school, with a value of 1 if true and 0 otherwise.	
schooling 4	Dummy variable indicating whether the individual has completed higher education, with a value of 1 if true and 0 otherwise.	
Per capita income	Per capita income.	In the relationship between income level and health status, a positive sign is expected, as higher purchasing power is associated with higher chances of individuals reporting their health status as satisfactory (Dachs, 2002).
sex	Dummy variable that assigns a value of 1 if the individual is male and 0 otherwise.	As pointed out in the study by Simão Filho *et al.*, being female is negatively related to the perception of health status. Therefore, the expected sign is positive.
color	Dummy variable that assigns a value of 1 if the individual is white and 0 otherwise.	Individuals of older age more frequently report poor health status. Thus, a negative relationship is expected between this variable and health status. (Pavao; Werneck; Campos, 2013)
chronic disease	Dummy variable that assigns a value of 1 if the individual has any chronic disease, and 0 otherwise.	A negative relationship is expected, as chronic diseases affect individuals' self-perception of health status, generally leading to its underestimation (Barros *et al.*, 2006).
sewage	Dummy variable that assigns a value of 1 if the individual's residence has access to a sewage system, and 0 otherwise.	Access to sewage services allows for improvement in health status. Therefore, a positive sign is expected (Zombini, 2013).

Continued

Table 1. *Continuation*

Variable	Description	Expected sign
location	Dummy variable that takes a value of 1 if the individual resides in an urban area, and 0 if in a rural area.	According to Kassouf (2005), residents of rural areas report worse health conditions and seek healthcare services only when they are ill rather than for prevention. Therefore, a positive relationship is expected.
migrants 5	Dummy variable that takes a value of 1 if the individual is a migrant and has resided at the destination for 5 to 9 years, and 0 otherwise.	Sign to be empirically verified.
migrants 10_i	Dummy variable that takes a value of 1 if the individual is a migrant and has resided at the destination for 10 years or more, and 0 otherwise.	
origin	Dummies representing from which of the Brazilian macroregions migrants originate: origin_south, origin_southeast, origin_central-west, origin_north, and origin_northeast.	Sign to be empirically verified.

Fuente: Source: Own elaboration.

The variable of *chronic disease* is assigned a value of 1 if the individual declares that they have had at least one chronic disease. In the analysis of an individual's schooling, the variable *schooling 1* is used as the baseline, similar to *Migrants 5,* which serves as the reference in the analysis of the migrant's years of residence. The region dummies are assigned a value of 1 to identify the migrant's origin. Thus, if a migrant originates from the South, for example, this dummy assumes a value of 1, whereas the dummies representing the other regions are assigned a value of 0.

III. Data and Descriptive Statistics

The data used were obtained from the National Household Sample Survey (PNAD), which contains individual data on personal and housing characteristics, employment and migration. Migration was incorporated into PNAD in the 1990s, with questions similar to those included in Demographic Censuses. This facilitated the study of migratory flows and migrant behavior (Cunha & Jakob, 2011).

It must be stressed that PNAD is a complex sample survey. Therefore, sample weights must be incorporated to provide an accurate interpretation of the data. PNAD data can also be treated as independent and identically distributed, as they contain all the necessary information for a complex sample (Silva *et al.*, 2002).

In certain years, additional surveys are incorporated into the PNAD to capture specific characteristics of the Brazilian population. In particular, supplementary surveys conducted in 1998, 2003 and 2008 collected information on the health status of individuals and made information available on general aspects of health, diseases and personal habits.

This study uses the information made available from these three years of supplementary health surveys as the sample was created by means of a cohort based on the year of birth, encompassing individuals born between 1948 and 1982. The analysis considered individuals born in one of the other four regions who migrated to the Midwest, as well as those born in the Midwest who remained there. Similarly, individuals who were born in one of the other four regions and migrated to the Southeast, as well as those who were born in the Southeast and remained there, were also considered.

Table 2 shows that there was a slight percentage variation in the composition of the sample, revealing a higher percentage of migrants in the Midwest than in the Southeast. For both regions, most of the sample is made up of migrants, as the study encompasses the total number of migrants who moved from their region of origin at least five years previously. Hence, individuals who had moved to these regions six, seven or more years earlier were included.

Table 2. *Distribution of data sample by region, according to years*

Midwest (MW)	1998	2003	2008
Total Sample	5173	7122	6990
Migrants	4286	6021	5990
Proportion of migrants in the total sample	0.8285	0.8454	0.8569
Southeast (SE)	1998	2003	2008
Total Sample	7.593	9.345	8.956
Migrants	4587	5973	5740
Proportion of migrants in the total sample	0.6041	0.6392	0.6409

Source: Own elaboration.

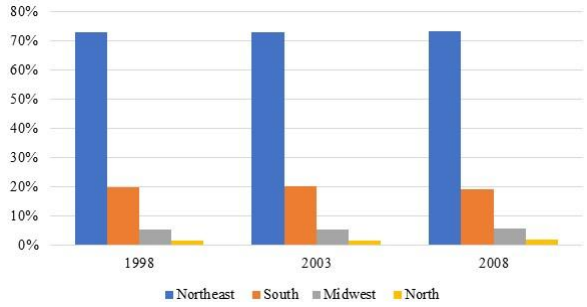
The percentage distribution of migrants is greater in the Midwest than in the Southeast, which could have stemmed from the process of settlement and the attraction of the respective regions. It is important to mention that the Midwest only received substantial government incentives from the 1930s onward (Araújo, 2018). In this respect, Tavares (2001) states that, initially, the destinations of the migratory flows were coastal towns and cities but later expanded to the interior, mainly within the state of São Paulo. Subsequent expansion into the interior of the country then began with the development of the agricultural frontier. The Midwest and North began to receive large migratory contingents, which led to intense population growth in the former, especially in urban areas.

Figures 1 and 2 illustrate the percentage of migrants by origin for each region of destination. The profile of the migrants in these regions is different.

In the Southeast, over 70% of migrants came from the Northeast, with little variation across the examined years. For the Midwest, approximately 40% of migrants came from the Northeast and a similar percentage from the Southeast.

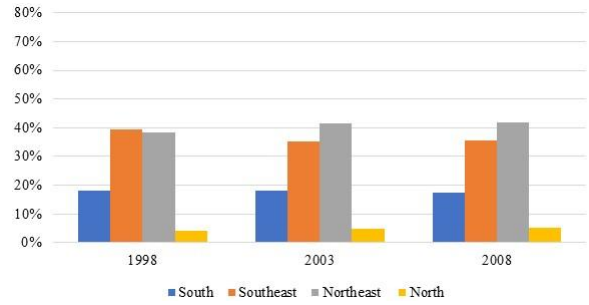
The issue of northeastern migration to the Southeast has been the subject of several studies. Ojima and Fusco (2015) analyzed the trajectory of northeastern migrants and highlighted the large numbers migrating to the

Figure 1. *Distribution of migrants, according to origin, residing in the Southeast for all years of the sample*



Source: Own elaboration.

Figure 2. *Distribution of migrants, according to origin, residing in the Midwest for all years of the sample*



Source: Own elaboration.

Southeast in search of better living conditions. As regards the Midwest, the construction of Brasília and the advance of the agricultural frontier attracted migrants from all Brazilian regions (Rigotti & Cunha, 2012; IPEDF, 2014).

Regarding migrants' origins, Maciel and Oliveira (2011) identified a pattern similar to that of the present study, namely that the Midwest and North are the regions with fewer emigrants. They also found that the majority of migrants residing in the Midwest were from the Northeast and Southeast, while migrants living in the Southeast came primarily from the Northeast.

Table 3. *Descriptive statistics of the variables used in the econometric models for the Midwest, for all years analyzed*

Variable	Mean	Minimum	Maximum
health status$_i$	2.8732	1	4
migrant	0.8451	0	1
sex	0.4870	0	1
color	0.4653	0	1
location	0.8714	0	1
chronic disease	0.4042	0	1
sewage	0.4670	0	1
per capita income	2,131.25	0	70838.40
schooling 1	0.1475	0	1
schooling 2	0.4396	0	1
schooling 3	0.2721	0	1
schooling 4	0.1408	0	1
migrants 5_i	0.1290	0	1
migrants 10_i	0.7160	0	1
southeast	0.1512	0	1
midwest	0.1549	0	1
northeast	0.3449	0	1
north	0.0410	0	1
south	0.1513	0	1

Source: Own elaboration.

The descriptive statistics of the variables used can be analyzed from Tables 3 and 4, considering the total sample for all years. It can be seen that the mean of health status declarations is higher in the Southeast than in the Midwest. Furthermore, the Midwest exhibits a higher average number of migrants who have lived there for more than 10 years. For both regions, most individuals have elementary schooling (*schooling 2*) and do not have any chronic diseases. In terms of income level, the Midwest has a higher mean.

Table 4. *Descriptive statistics of the variables for the Southeast, for all years analyzed*

Variables	Mean	Minimum	Maximum
health status$_i$	2.9527	1	4
migrant	0.6295	0	1
sex	0.4715	0	1
color	0.5649	0	1
location	0.9425	0	1
chronic disease	0.3898	0	1
sewage	0.8174	0	1
per capita income	1,675.22	0	68827.88
schooling 1	0.2018	0	1
schooling 2	0.4662	0	1
schooling 3	0.2438	0	1
schooling 4	0.0881	0	1
migrants 5_i	0.0818	0	1
migrants 10_i	0.5476	0	1
southeast	0.3705	0	1
midwest	0.0342	0	1
northeast	0.4603	0	1
north	0.0107	0	1
south	0.1243	0	1

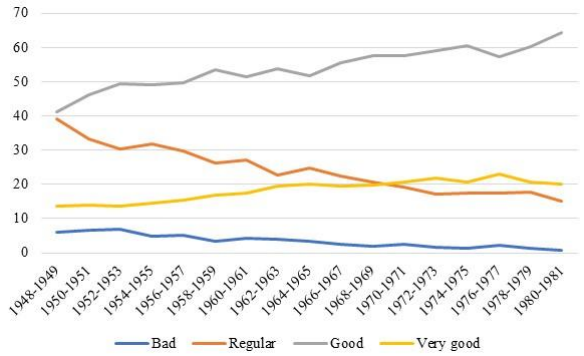
Source: Own elaboration.

Regarding sex, most of the sample is female in the two regions of destination analyzed. As regards color, in the Southeast, the majority is white, while in the Midwest, it is non-white. In terms of the relationship between these characteristics and self-declaration of health status, the literature found that women tended to report a worse health status than men among both migrants and native-born individuals. As for color, it was observed that a smaller proportion of non-whites tended to declare a "very good" health status (Barata *et al*., 2007; Simão Filho *et al*., 2018).

As determined by the Census, the majority of the population in both regions lived in the urban area. In the Southeast, most people in the sample had access to the sewage network, which was not the case in the Midwest. These results are supported by the literature, which reports that residents of rural areas have greater difficulty in accessing health services and that enhanced sanitation services contribute to prevention and, consequently, a reduction in the incidence of disease. In this regard, the presence of even minimal sanitation services is related to improved health conditions (Arruda *et al.*, 2017; Zombini, 2013).

Regarding declarations of perceived health status, Figures 3 and 4 depict the proportion of the sample that reported their health status within each category for both regions. The results show that for both regions, the number of self-declarations of "very good" is higher and the number of "fair" and "poor" is lower when the proportion of young people in the sample is higher. This result is corroborated by the literature, indicating that as people age, positive health declarations tend to decrease (Camarano, 2002).

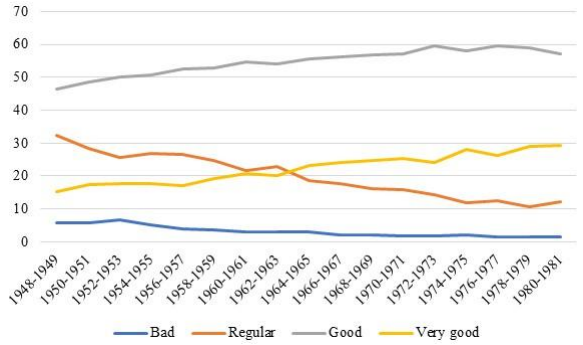
Figure 3. *Evolution of health status self-reports, according to year of birth cohorts for the Midwest*



Source: Own elaboration.

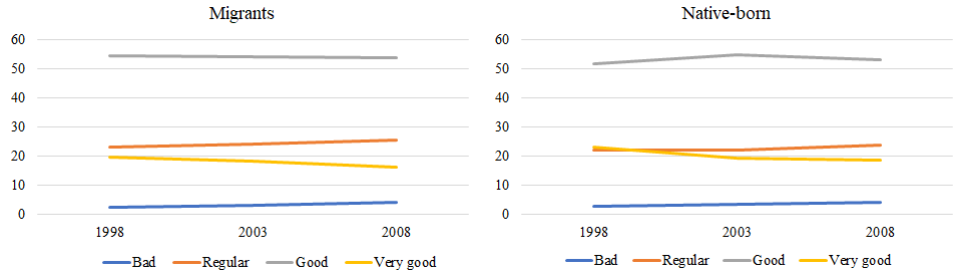
In order to analyze the evolution of self-declarations of perceived health status between the years covered by the sample, Figures 5 and 6 present these proportions for migrants and native-born individuals in both regions.

Figure 4. *Evolution of health status self-reports, according to year of birth cohorts for the Southeast*



Source: Own elaboration.

Figure 5. *Evolution of health status for migrants and native-born of the Midwest, according to the years analyzed*

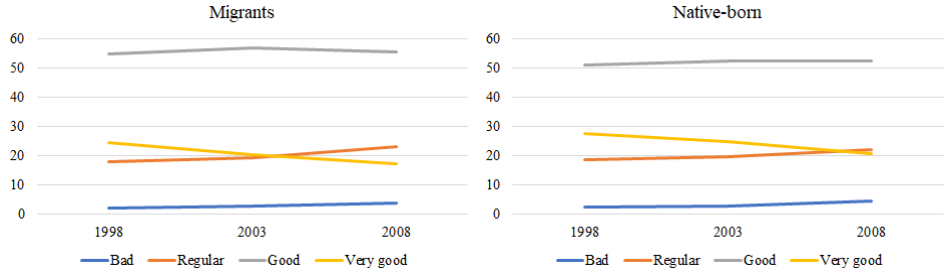


Source: Own elaboration.

For both regions of destination, the highest percentage of individuals declare their health status as "good," with minor fluctuations between the years, both for migrants and native-born residents. In general, there was also a slight increase in reports of perceived health status as "poor" and "fair", alongside a drop in the proportions of self-reported "very good" health status.

These differences observed between native-born individuals and migrants and between regions can also be attributed to the influence of various socioeconomic factors on health status. Because physical, mental and social

Figure 6. *Evolution of health status for migrants and native-born of the Southeast, according to the years analyzed*



Source: Own elaboration.

well-being are complementary, migrants may perceive their health status differently, as they experienced different social and acculturation situations (Dachs & Santos, 2006; Kopec *et al.*, 2001).

Self-reported health status is also influenced by the presence or absence of chronic disease. The correlation between this variable and health status was -0.3881 for the Midwest and -0.3855 for the Southeast, which indicates a negative relationship between contracting a chronic disease and health status, a finding corroborated by Simão Filho *et al.* (2018).

Considering that income is a factor affecting health status, Table 5 displays this relationship for native-born and migrants by receiving region. As already noted, the monetary income values were deflated, using the National Consumer Price Index (INPC) as a basis and updated to 2008. Information on per capita income is used, adjusted to 2008 values, the last year of the sample, employing the INPC.

The highest income means were observed among individuals who declared their health status as "good" and "very good". This relationship was also demonstrated in a study by Dachs (2002); the likelihood of an individual declaring their health status as "very good" increased by 10% with each increase in income decile.

Table 5. *Mean income of migrants and native-born in relation to health status, per year and receiving region*

		1998			
		Poor	Fair	Good	Very good
Midwest	Migrant	R$ 1172.86	R$ 1989.45	R$ 2932.18	R$ 4637.21
	Native-born	R$ 1495.31	R$ 1739.06	R$ 2676.54	R$ 4173.14
Southeast	Migrant	R$ 1573.00	R$ 1806.05	R$ 2196.04	R$ 2598.84
	Native-born	R$ 1333.75	R$ 1794.07	R$ 2512.89	R$ 3080.88
		2003			
Midwest	Migrant	R$ 1508.68	R$ 1752.84	R$ 2530.09	R$ 4144.59
	Native-born	R$ 1525.26	R$ 1794.12	R$ 2605.09	R$ 4953.33
Southeast	Migrant	R$ 1578.33	R$ 1492.02	R$ 1788.60	R$ 2346.25
	Native-born	R$ 1305.09	R$ 1773.79	R$ 2219.14	R$ 3122.02
		2008			
Midwest	Migrant	R$ 562.48	R$ 685.59	R$ 995.32	R$ 1631.32
	Native-born	R$ 366.05	R$ 624.87	R$ 901.66	R$ 1528.77
Southeast	Migrant	R$ 587.81	R$ 554.83	R$ 661.67	R$ 970.24
	Native-born	R$ 438.39	R$ 593.90	R$ 878.72	R$ 1407.87

Source: Own elaboration.

In terms of the relationship between migration and health status, another relevant factor is the migrant's years of residence at the destination. Halli and Hancham (2005) argue that understanding the evolution of a migrant's health status throughout their years of residence facilitates the implementation of targeted health measures to improve their care. Table 6 presents the migrant's health status in relation to their years of residence in each receiving region. There was a slight worsening in self-reported health status over the years, irrespective of years of residence. In addition, it was observed that individuals residing for more than 10 years were more likely to self-report their health status as "poor" and "fair" than those living for 5 to 9 years in both receiving regions. However, the percentages in the Southeast are higher than those

in the Midwest when the "very good" health status is taken into account. A deterioration in health status over the years of living in the region of destination was also identified in the study conducted by Kearns *et al.* (2017). This trend could be attributed to a variety of factors such as age, acculturation and the challenges faced during migration.

Table 6. *Years of residence and perceived health status per receiving region*

			5 to 9 years	10 years or more
1998	SE	Total	758 migrants (100%)	3829 migrants (1005)
		Poor	12 migrants (1.58%)	95 migrants (2.48%)
		Fair	125 migrants (16.49%)	695 migrants (18.15%)
		Good	443 migrants (58.44%)	2083 migrants (54.40%)
		Very good	956 migrants (23.48%)	956 migrants *24.97%)
	MW	Total	785 migrants (100%)	3501 migrants (100 %)
		Poor	16 migrants (2.04%)	99 migrants (2.83%)
		Fair	171 migrants (21.78%)	816 migrants (23.31%)
		Good	458 migrants (58.34%)	1875 migrants (53.56%)
		Very good	140 migrants (17.83%)	711 migrants (20.31%)
2003	SE	Total	903 migrants (100%)	5070 migrants (100%)
		Poor	15 migrants (1.66%)	166 migrants (3.27%)
		Fair	152 migrants (16.83%)	1016 migrants (20.04%)
		Good	527 migrants (58.36%)	2873 migrants (56.67%)
		Very good	209 migrants (23.15%)	1015 migrants (20.02%)
	MW	Total	962 migrants (100%)	5059 migrants (100%)
		Poor	24 migrants (2.49%)	174 migrants (3.44%)
		Fair	208 migrants (21.62%)	1252 migrants (24.75%)
		Good	526 migrants (54.68%)	2733 migrants (54.02%)
		Very good	204 migrants (21.21%)	900 migrants 17.79%

Continued

Table 6. *Continuation*

2008	SE	Total	458 migrants (100%)	5282 migrants (100%)
		Poor	14 migrants (3.06%)	216 migrants (4.09%)
		Fair	97 migrants (21.18%)	1226 migrants (23.21%)
		Good	251 migrants (54.80%)	2939 migrants (55.64%)
		Very good	96 migrants (20.96%)	901 migrants (17.06%)
	MW	Total	741 migrants (100%)	5249 migrants (100%)
		Poor	19 migrants (2.56%)	228 migrants (4.34%)
		Fair	153 migrants (20.65%)	1384 migrants (26.37%)
		Good	423 migrants (57.09%)	2797 migrants (53.29%)
		Very good	146 migrants (19.70%)	840 migrants (16.00%)

Source: Own elaboration.

Descriptive statistics provide evidence of the relationship between migration and self-reports of individual health status in the receiving regions considered. This relationship is addressed in the following subsection.

IV. Econometric Results

In this subsection, the econometric results are presented and discussed based on the estimates of the ordered Probit model and the scenarios created. Table 6 displays the results of the model that determines health status for the Southeast and Midwest, which are considered receiving regions in this study. Dummy variables were included to control for the years analyzed and the individuals in the cohorts. The results of the Wald test for both models reject the null hypothesis, indicating that the ordered probit model is a good fit for the data. Specifically, the chi-square statistic for the Midwest model was 5300.26, with a *p*-value of 0.0. For the Southeast model, the chi-square statistic was 4536.88, with a *p*-value of 0.0.

Table 7. *Results of the econometric models estimated for the regions of destination*

	Midwest			Southeast		
Variable	Coeff.	Standard error	$P > \|Z\|$	Coeff.	Standard error	$P > \|Z\|$
migrant	-0.00942^{ns}	0.0322	0.770	-0.08232***	0.0280	0.003
migrants 10	-0.00060^{ns}	0.0251	0.981	0.04045^{ns}	0.0269	0.133
origin_south	0.04092^{ns}	0.0267	0.125	-0.00407^{ns}	0.0227	0.857
origin_southeast	0.04837**	0.0209	0.021	-	-	-
origin_north	0.00547^{ns}	0.0425	0.898	0.09960^{ns}	0.0692	0.196
origin_midwest	-	-	-	0.12575***	0.0396	0.002
schooling 2	0.14121***	0.0274	0.000	0.10396***	0.0216	0.000
schooling 3	0.45800***	0.0295	0.000	0.32487***	0.0242	0.000
schooling 4	0.69284***	0.0362	0.000	0.60074***	0.0330	0.000
per capita income	0.00003***	0.0002	0.000	0.00004***	0.0003	0.000
chronic disease	-0.84749***	0.0178	0.000	-0.84570***	0.0156	0.000
sex	0.17803***	0.0163	0.000	0.10206***	0.0140	0.000
color	0.08889***	0.0171	0.000	0.11085***	0.0145	0.000
location	0.02681^{ns}	0.0255	0.293	0.05026^{ns}	0.0314	0.110
sewage	0.07375***	0.0178	0.000	0.06967***	0.0193	0.000
cohort dummies	Yes			Yes		
dummies of years	Yes			Yes		
cut 1	-2.15167	0.0615		-2.27774	0.0566	
cut 2	-0.70691	0.0591		-0.96978	0.0547	
cut 3	1.04075	0.0593		0.74566	0.0545	
Num. of observations	28894			19285		
Wald chi2	5300.26			4536.88		
Prob. > chi2	0.0000			0.0000		

***significant at 1%, **significant at 5%, *significant at 10%, ns - not significant.
Source: Own elaboration.

In relation to the main objective of this research, it was concluded that migration affects individual health status in the receiving regions in different

ways. In the Midwest, migration had no impact on self-reported health, while in the Southeast, it had a negative effect, indicating that migrants tended to declare a lower health status.

The above-mentioned difference may arise from the discrepancies between the regions in terms of climatic, cultural and infrastructural conditions. Such differences in the health sector are demonstrated in the study by Viacava and Bellido (2016), which analyzes health services and other variables available in the PNAD and the National Health Survey (PNS). The authors found that in the Southeast there is a lower percentage of consultations via the public system than in the other regions, which could affect migrants' access to these services and thus influence their self-assessment.

Tables 3 and 4 showed differences between the two regions in the sample, indicating that the Midwest has more migrants than the Southeast. In addition, Figures 5 and 6 showed a slight discrepancy in the evolution of self-declarations. In this respect, in the Midwest, the trajectory of the self-declarations was maintained, with more "fair" than "very good" declarations. Conversely, in the Southeast, the trend is inverted from 2003 onwards, with more "fair" than "very good" declarations, which could contribute to explaining the different results.

Furthermore, it must be considered that the characteristics brought by migrants from their respective regions of origin could explain a large part of these differences. Cook's (1994) study demonstrates that cultural patterns of behavior and beliefs regarding health care have an impact on the quality of health of individuals.

The econometric estimation results reveal that migrants from the Southeast declare better health status when the Midwest is considered as a destination, with the results being non-significant for those from the North and South in comparison to the Northeast. In turn, when considering the Southeast as the receiving region, it is observed that migrants from the Midwest declare a better health status than those from the Northeast. In contrast, migrants from the South and North regions did not exhibit any statistically significant differences in relation to those from the Northeast.

How can these discrepancies be explained? As illustrated in Figures 1 and 2, the composition of migrants' origin is not the same for the two regions, as the majority in the Southeast come from the Northeast, where the health status declaration is predominantly "fair" and "poor". In the Midwest, there is a more equitable distribution between migrants from the Southeast, who tend to declare better health status, and those from the Northeast, thus contributing to the non-significance of the results. In line with these results, the studies by Vigotti *et al.* (1988) and Fascioli *et al.* (1995) also identified that the region of origin is a major factor in the health status of migrants.

As previously mentioned, the years of residence in the region of destination play a critical role in the relationship between migration and health status. Taking as a parameter the migrants who have lived between 5 and 9 years at the destination, there was no statistical significance in the two receiving regions, indicating that the years of residence do not affect the migrants' health status. Although there is evidence in the literature that the health status of individuals deteriorates as the years of residence increase, taking age and acculturation factors into account (Halli; Ancham, 2005; Kearns *et al.*, 2017; Rechel *et al.*, 2013; Kaleta *et al.* 2009; Poulter *et al.*, (1990), this trend was not supported in our study. This may be partly explained by Halli and Ancham's (2005) study, which revealed that migrants tend to have better health status than the native-born, although they tend to present greater similarity over time.

In addition, most of the other control variables exhibited statistical significance. In this regard, the dummy denoting the contraction of a chronic disease presents a negative sign. The literature shows that individuals with a chronic disease may experience difficulty in performing day-to-day activities, thereby compromising their quality of life. Accordingly, individuals who are afflicted with a chronic disease rate their health status as inferior compared to others (Simão Filho *et al.* 2018).

The two receiving regions exhibited positive signs when the relationship between schooling and health status was analyzed considering individuals who are illiterate or lack schooling as baseline (Sch1). Consequently, it can be concluded that an individual's health status improves as their schooling level

increases. This finding is supported by studies such as those of Kaleta *et al.* (2009) and Jiménez-García *et al.* (2008).

Using per capita income to capture people's economic conditions, it was found that the higher the income, the higher the likelihood of an individual having good health status. The literature on the subject argues that higher income levels facilitate enhanced disease prevention and hygiene conditions for people, thus improving individuals' health status (Santos *et al.*, 2012).

Regarding place of residence, there was no statistical significance in reporting better health status for individuals living in an urban area. Although urban residents have greater access to health services, some studies have shown that this does not imply better health conditions when compared to those of rural residents (Arruda; Maia; Alvez, 2017).

The coefficient of the variable denoting access to a sewage network is significant and positive. Therefore, individuals who have access to a sewage network tend to declare better health status. Scriptore (2016) demonstrated the importance of sanitation services by asserting that improvements in terms of sanitation are beneficial for health status and reduce healthcare expenses, for instance, by mitigating the spread of waterborne diseases.

In the estimated models with dichotomous dependent variables, such as Probit, the probability of a given event occurring must be inferred. Scenarios were therefore created to analyze the probability of a certain individual declaring their health status. As mentioned already, two baseline scenarios were defined, one for the native-born individual and the other for the migrant. These scenarios were created based on the characteristics of the mean of the sample for both migrants and native-born individuals. As mentioned above, Scenario 1, the baseline for the native-born, considers a native-born female who is white, has an income of R$ 2000.00, has access to a sewage network, does not have a chronic disease, lives in an urban area, and was born between 1964 and 1965. For Scenario 2, the migrant baseline, the characteristics of Scenario 1 are maintained but a migrant born in the Northeast is used.

Furthermore, five additional scenarios were created. Scenarios 3, 4 and 5 denoted migrants for whom the following characteristics were altered in relation to the migrant's baseline scenario: origin, schooling (higher

education) and the presence of chronic illness, respectively. Scenarios 6 and 7 represented the native-born individuals for whom the characteristic of schooling is changed to higher education, and the absence of a chronic disease is changed to the presence of a chronic disease, in relation to the baseline scenario of the native-born. These characteristics were chosen due to their statistical impact on an individual's health status and their alignment with the specialized literature. Tables 8 and 9 illustrate these scenarios.

The econometric results for the Midwest revealed no significant differences between migrants and native-born individuals (S1 and S2). When Scenarios 3, 4 and 5 are analyzed in relation to Scenario 2 (baseline for migrant), no differences between the probabilities in Scenario 3 are observed. However, for Scenarios 4 and 5, significant differences were found for all probabilities of self-declared health status presented a positive difference of 18.06 pp in the probability of individuals with higher education declaring their health status as "very good". Additionally, in Scenarios 5 and 2, the likelihood of individuals with chronic disease declaring their health status as "fair" is 23.66 pp higher.

When the native-born individuals with higher education (S6) were compared to those with chronic diseases (S7) in relation to the native-born baseline (S1), a similar dynamics to that observed in migrants regarding the higher education and chronic disease variables was evident. However, when higher education between native-born and migrant, S6 and S4, and chronic diseases between the native-born and migrant, S7 and S5 were compared, it was found that there were no differences between the probabilities of the native-born and migrant declaring any health status.

Observing baseline scenarios (S1) and (S2) for the Southeast, it was found that the migrants had 0.17 pp more chances of declaring their health status as "poor" and 1.58 pp more chances of declaring their health status as "fair". However, there were no significant differences in the probabilities of declaring their health status as "good" or "very good".

Concerning migrants, it was observed that the characteristics of Midwest origin (S3), education (higher education) (S4), and the presence of chronic disease (S5), exhibit significant differences for all health status declarations in relation to the baseline scenario (S2).

Table 8. *Probabilities and scenarios for self-reported health status for the Midwest*

Scenario 1 (S1): baseline for native-born		Confidence interval (95%)
P (0 < health status ≤ 1)	1.05%	0.80% – 1.30%
P (1 < health status ≤ 2)	18.29%	16.25% – 20.34%
P (2 < health status ≤ 3)	61.70%	60.93% – 62.46%
P (health status ≥ 4)	18.96%	16.72% – 21.19%
Scenario 2 (S2): baseline for migrants		
P (0 < health status ≤ 1)	1.08%	0.81% – 1.34%
P (1 < health status ≤ 2)	18.53%	16.37% – 20.67%
P (2 < health status ≤ 3)	61.69%	60.92% – 62.46%
P (health status ≥ 4)	18.70%	16.39% – 21.02%
Scenario 3 (S3): Southeast migrant		
P (0 < health status ≤ 1)	0.95%	0.70% – 1.19%
P (1 < health status ≤ 2)	17.35%	15.20% – 19.48%
P (2 < health status ≤ 3)	61.67%	60.90% – 62.45%
P (health status ≥ 4)	20.03%	17.54% – 22.52%
Scenario 4 (S4): Migrant with higher education		
P (0 < health status ≤ 1)	0.22%	0.15% – 0.29%
P (1 < health status ≤ 2)	7.76%	6.42% – 9.10%
P (2 < health status ≤ 3)	55.26%	53.06% – 57.46%
P (health status ≥ 4)	36.76%	33.26% – 40.27%
Scenario 5 (S5): Migrant with chronic disease		
P (0 < health status ≤ 1)	7.32%	6.06% – 6.58%
P (1 < health status ≤ 2)	42.29%	39.94% – 44.64%
P (2 < health status ≤ 3)	46.25%	43.55% – 48.95%
P (health status ≥ 4)	4.14%	3.35% – 4.92%
Scenario 6 (S6): native-born with higher education		
P (0 < health status ≤ 1)	0.21%	0.15% – 0.28%
P (1 < health status ≤ 2)	7.63%	6.37% – 8.88%
P (2 < health status ≤ 3)	55.04%	52.93% – 57.15%
P (health status ≥ 4)	37.12%	33.80% – 40.43%
Scenario 7 (S7): native-born with chronic disease		
P (0 < health status ≤ 1)	7.19%	6.00% – 8.37%
P (1 < health status ≤ 2)	42.04%	39.78% – 44.30%
P (2 < health status ≤ 3)	46.54%	43.98% – 49.10%
P (health status ≥ 4)	4.22%	3.46% – 4.98%

Source: Own elaboration.

Table 9. *Probabilities and scenarios for self-reported health status for the Southeast*

Scenario 1 (S1): Baseline for native-born		Confidence interval
P (0 < health status ≤ 1)	0.69%	0.55% – 0.82%
P (1 < health status ≤ 2)	11.63%	10.44% – 12.82%
P (2 < health status ≤ 3)	58.62%	57.56% – 59.67%
P (health status ≥ 4)	29.07%	26.91% – 31.23%
Scenario 2 (S2): Baseline for migrants		
P (0 < health status ≤ 1)	0.86%	0.67% – 1.06%
P (1 < health status ≤ 2)	13.21%	11.66% – 14.75%
P (2 < health status ≤ 3)	59.60%	58.61% – 60.61%
P (health status ≥ 4)	26.32%	23.83% – 28.82%
Scenario 3 (S3): Midwest migrant		
P (0 < health status ≤ 1)	0.61%	0.41% – 0.80%
P (1 < health status ≤ 2)	10.84%	8.96% – 12.73%
P (2 < health status ≤ 3)	57.97%	56.21% – 59.72%
P (health status ≥ 4)	30.57%	26.86% – 34.28%
Scenario 4 (S4): Migrant with higher education		
P (0 < health status ≤ 1)	0.20%	0.14% – 0.26%
P (1 < health status ≤ 2)	5.62%	4.62% – 6.62%
P (2 < health status ≤ 3)	49.78%	47.26% – 52.30%
P (health status ≥ 4)	44.39%	40.87% – 47.92%
Scenario 5 (S5): migrant with chronic disease		
P (0 < health status ≤ 1)	6.20%	5.20% – 7.20%
P (1 < health status ≤ 2)	34.55%	32.42% – 36.68%
P (2 < health status ≤ 3)	52.26%	50.24% – 54.28%
P (health status ≥ 4)	6.99%	5.93% – 8.05%
Scenario 6 (S6): native-born with higher education		
P (0 < health status ≤ 1)	0.16%	0.11% – 0.20%
P (1 < health status ≤ 2)	4.77%	4.02% – 5.52%
P (2 < health status ≤ 3)	47.42%	45.16% – 49.67%
P (health status ≥ 4)	47.65%	44.66% – 50.64%
Scenario 7 (S7): native-born with chronic disease		
P (0 < health status ≤ 1)	5.26%	4.52% – 5.99%
P (1 < health status ≤ 2)	32.34%	30.53% – 34.15%
P (2 < health status ≤ 3)	54.24%	52.70% – 55.78%
P (health status ≥ 4)	8.15%	7.17% – 9.14%

Source: Own elaboration.

The evaluation of Scenarios 6 and 7 in relation to the baseline scenario (S1) of the native-born revealed that all the differences between the probabilities were significant. When compared to Scenario 1, the largest significance was observed among individuals with chronic disease (S7), where the proportion declaring health status as "fair" increased by 20.71 pp, while those reporting it as "very good" decreased by 20.92 pp.

Significant results were observed for the probabilities of declarations by the native-born and migrants, however with minimal discrepancies between the two groups and some non-significant results. The findings indicate that the characteristics of schooling and chronic diseases positively affected the probabilities when compared to the baseline scenarios. Specifically, schooling (higher education) mainly influenced the probability of declaring health status as "very good", and the presence of a chronic disease affected the probability of declaring health status as "fair". However, there were no differences between native-born individuals and migrants.

Slightly different probabilities between migrants and non-migrants were reported by Barbone *et al.* (1996), revealing that the odds ratio for developing breast cancer among females over 24 years of age who migrated from central and southern Italy to the north of the country was 0.6 and 0.7, respectively. For younger migrants, there was no significant difference. In turn, Fascioli, *et al.* (1995) analyzed the risks associated with migrants contracting various types of cancer and showed that such risks were 1.30 for males and 1.31 for females when compared to the local population at their place of residence.

Conclusion

This article aimed to analyze the effect of migration on the health status of individuals in Brazil, focusing on the two largest receiving regions, the Midwest and the Southeast. The literature indicates a complex relationship, providing evidence that migrants declare a worse health status while also including studies that report opposing results. To achieve its intended purpose, the study used a panel with three years of analysis, 1998, 2003 and 2008, and implemented the Pooled method with control dummies for the time variables. Estimation was carried out using an ordered Probit model.

The overall findings indicate that migrants exhibited worse health status than the native-born in the Southeast, while no statistical significance was observed in the Midwest. In addition, characteristics acquired in their region of origin influenced the health status of migrants in different ways depending on the destination. In that respect, it was found that migrants from the Southeast who were currently residing in the Midwest tended to declare better health status than those who had migrated from the Northeast. Furthermore, migrants from the Midwest living in the Southeast also declared better health status than those from the Northeast. It was also found that the years of residence did not affect the health status of the migrants in the two receiving regions considered.

The results underscore the importance of formulating and implementing public policies, particularly in relation to raising awareness and adopting healthy hygiene habits. Such policies could enhance the training of professionals in assisting migrants and understanding the peculiarities of each region to better diagnose their health status, especially those coming from the Northeast. The main limitation of the present study is the restricted data, which prevents the analysis of a real panel dataset that could control for endogeneity. Finally, it is recommended to conduct further studies to provide more specific information on the regions, as this would probably help in understanding the disparities between them.

Ethics Statement

This research article did not work with a person or groups of persons to generate the data used in the methodology; therefore, it did not require the endorsement of an Ethics Committee for its realization.

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