ORIGINAL ARTICLE

Migration and school flow of the 2008-2019 cohort of students in Minas Gerais[*]

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Student migration is an important phenomenon that can have implications for educational outcomes. Few studies have evaluated its influence on academic outcomes, particularly in the context of developing countries. This study examines the relationship between migration and the school flow of the cohort of students from Minas Gerais enrolled in the first year of elementary school in 2008. Using longitudinal data from school censuses from 2008 to 2019, we compare the regularity of the school flow between migrant and non-migrants. The findings reveal a slight difference in the regularity of the school flow between non-migrants and migrants prior to migration. However, post-migration, the school flow of migrants becomes more irregular, except in cases where migrations coincide with school-level transitions. In particular, migration during the transition to secondary school shows strong positive selectivity beforehand and little variation afterward, suggesting migration may be driven by investing in education. These results underscore the importance of considering migration in studies on educational outcomes and highlight the benefits of longitudinal analysis for demographic studies.

Keywords: Migration. School flow. Minas Gerais.

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Introduction

The study of demographic phenomena is indispensable for understanding the educational characteristics of a population. On the one hand, an individual's educational attainment affects their demographic behaviour, with implications for fertility, mortality, and migration (Lutz; Goujon; Doblhammer-Reiter, 1998). On the other hand, demographic characteristics also influence a population's educational level. For example, a population's size and age structure are directly linked to the demand for education and the ability to finance the education system.

In addition to the size and age structure of a population, other demographic characteristics and phenomena influence, and are influenced by, individuals' educational levels. Of these, student migration is a relevant phenomenon that can have implications for the educational outcomes of children and teenagers. However, studies analysing how migration affects educational outcomes are rare. In demographic studies, it is more common to focus on the inverse relationship, i.e., how education influences migratory movements (Rigotti; Signorini; Hadad, 2020). To a large extent, this scarcity of studies on the impact of migration on education is due to the lack of appropriate data, a limitation we seek to address with longitudinal data.

Migratory movements are usually characterised by high selectivity, especially regarding age, education, and socio-economic status (Bernard; Bell, 2018). In this context, the concept of selectivity is applied by comparing the specific characteristics of migrant students before migration with those of their non-migrant peers. Education-related migration selectivity in demographic studies generally investigates how education affects migration, but little is known about the inverse relationship.

This study seeks to contribute to our understanding how migration affects students' educational outcomes by analysing the relationship between migration and the school flow of the cohort of students from Minas Gerais who were enrolled in the first year of elementary school in 2008. This general goal is divided into two specific goals: to evaluate the possible selectivity of students related to school flow during migration; and to compare the school flow of migrant and non-migrant students after migration. This comparison will be based on the regularity of the students' school trajectory between 2008 and 2019. The regular student only has promotions until the year analysed, as will be discussed in detail in the methodological section.

This study aims to contribute to the fields of both demography and education, given the lack of studies on the frequency with which students migrate and the possible consequences of these movements. This work uses a longitudinal database built by Inep, which has been relatively little explored, to study student migration and its relationship with educational outcomes. The period analysed makes it possible to describe in detail the trajectory of a cohort from the start of elementary school to the end of secondary school, whereas previous studies have focused on just one level or specific periods (Rigotti; Castro; Hadad, 2021;

Rigotti; Hadad, 2018; Rigotti; Signorini; Hadad, 2020; Soares; Alves; Fonseca, 2021). The results highlight the need to consider student migration in studies on the determinants of educational outcomes.

The following section aims to highlight the findings of relevant studies on the impact of migration on student performance.

Literature review

Several recent studies on migration have focused considerable attention on international flows, in parallel with the growth in the number of people moving to other countries. The International Organization for Migration (IOM) estimates that the number of international migrants increased from 173 million in 2000 to 281 million in 2022, representing 3.6% of the global population. The search for employment appears to be the main reason for migration, given that 60.0% of the total are migrant workers, although children make up a considerable share of migrants (14.6%) (McAuliffe; Triandafyllidou, 2021). The importance of international migration in the global context is reflected in the studies on its effect on children's educational performance, as will be discussed in the following section. However, the IOM report acknowledges that migration within countries is a far more prevalent phenomenon, with an estimated 740 million individuals engaged in such movements in 2009, according to the most recent available data (McAuliffe; Triandafyllidou, 2021).

In Brazil, more than 14 million people moved between 2005 and 2010 (Rigotti *et al.*, 2014). This period coincides with the continued increase in the coverage of primary and secondary education that began in the previous decade, which is also reflected in the educational composition of migrants. Between the 1991 and 2010 Brazilian demographic censuses, the number of internal migrants aged 25 years or older who had up to a fourth grade education increased from 1,323,000 to 1,760,000, whereas the growth in the number of internal migrants in the same age group who had a university degree was much faster, rising from just 389,000 in 1991 to 1,432,000 in 2010 (Rigotti *et al.*, 2014).

Using census data mainly from 2005 to 2010, Bernard and Bell (2018) found that education significantly impacted the probability of internal migration in 88% of 56 countries studied. While the effect tended to increase with higher levels of education, among Latin American internal migrants, educational selectivity was limited, and the association was weaker. In Brazil in particular, completing elementary school did not affect the chances of migrating, while completing secondary school was associated with a lower probability of migration. By contrast, completing higher education had the greatest impact on the probability of migrating, as reflected in the significant increase in migrants with this level of education between 1991 and 2010. In more recent work, Gonzáles-Leonardo *et al.* (2022) analysed the educational selectivity of internal migrants in 12 European countries, emphasising the variation between native and foreign populations born inside and outside the European Union. The authors found evidence of a strong positive selectivity of

foreign-born populations with higher education, as these populations were twice as likely to migrate internally as natives with comparable education, except in Hungary, where international immigrants were less likely to migrate internally.

The majority of migrants are young adults experiencing major life-cycle transitions, such as entering higher education or the job market, or entering marriage or motherhood (Rogers; Castro, 1981). The migration of children and young students, which is the focus of our study, reflects family motivations, as migrants in this group are usually tied to the adults – typically their parents or guardians – who decided to migrate.

The effects of the family's socio-economic status on the proficiency of Brazilian students have been known since the 1990s, when the first results of the Basic Education Assessment System (SAEB) were published. In general, inequalities in school performance favour white students from families with higher socio-economic status over black students from families with lower socio-economic status (Soares; Alves, 2003).

More recent studies (Ferrão *et al.*, 2017; Ferrão; Alves, 2023) have recognised and incorporated the irregularities in the Brazilian school flow, especially retention, which is an old problem in the Brazilian school system (Teixeira de Freitas, 1940; Ribeiro, 1991). Ferrão *et al.* (2017) showed that the lower the socio-economic status of the student, the greater the risk of retention, which in turn increases the chances of retention, regardless of whether the school the student attends is public or private. An analysis of the prevalence of the regular school trajectory (without retention or dropout) among the 2007-2017 cohort of Brazilian students found evidence of an increase in the gender gap in favour of girls, but also that the gaps by socio-economic status and race/colour had narrowed, although they remained relevant. However, the negative effect of the proportion of repeaters per school on the individual probability of success increased (Ferrão; Alves, 2023).

These more recent analyses indicate that individual student characteristics, such as gender and race/colour, and their relationship to retention should be considered. However, studies seeking to understand whether migrant students are disadvantaged compared to non-migrant students are much scarcer. Spatial movements can significantly affect the performance of these students, but little is known about this association, especially in the context of Brazil.

The concept of social capital proposed by Coleman (1988) is essential to understanding one of the mechanisms through which migration is associated with students' educational outcomes. While human capital refers to the skills and the knowledge acquired by an individual, social capital consists of the relationships between individuals and the operationalisation of the products of these relationships to benefit the individuals themselves (Coleman, 1988).

In the study of the association between social capital and human capital, social capital can be divided into social capital within the family and social capital outside the family. The latter is derived from relationships between parents and the community and between children and teachers or peers. The quality of these relationships can help to build the

human capital of children and teenagers. The hypothesis proposed by Coleman (1988) is that frequent changes of residence hinder the formation of these relationships, leading to lower educational outcomes. There is evidence for the United States that students who changed residence were more likely to drop out of school (Astone; McLanahan, 1994; Coleman, 1988), and that this probability increased with the number of moves (Coleman, 1988).

However, the effects of a change of municipality on educational performance also depend on the students' previous experiences, as students who migrate may be better or worse off than those who do not, i.e., movements are selective, and vary across different population groups. Pribesh and Downey (1999) found that a large part of the gap in the results of students who did and did not move was pre-existing, i.e., the children who moved already had a disadvantage in school performance compared to their peers at origin. In addition, part of the association between lower results and changes of school has been linked to curriculum differences (Pribesh; Downey, 1999). Therefore, the disruption of relationships is not the only mechanism through which migration can affect educational outcomes.

However, selectivity is not necessarily negative. Thomas (2012) found that black children of international immigrants and internal migrants in the United States had lower dropout rates than non-migrants. The positive selectivity of migrants' parents based on unobserved attributes could explain why their children have better school performance than the children of non-migrants (Thomas, 2012). In the US, there is also evidence of greater positive selection for immigrants from less educated populations than from highly educated populations in their countries of origin, although the degree of educational selectivity varied considerably (Feliciano, 2005). Similarly, Luthra (2010) found that the children of immigrants to Germany from five European countries, with the exception of Italy, outperformed their peers in their country of origin in Programme for International Student Assessment (Pisa) 2003 and 2006.

When it comes to selectivity, the case of the success of Asian Americans has attracted considerable attention. Gambol (2023) referred to the "hyper-selectivity" that has occurred in immigration from the post-1965 period onwards, with a focus on the second generation of Chinese and Filipino migrants living in the USA. The study found a clear disparity between the two cases, largely due to the opposite gender compositions of the two migrant groups. However, other results point to the complexity of this issue. It was, for example, shown that the occupations of Filipino parents did not have the expected significant effects on their children's chances of obtaining a university degree, but that education did matter. Moreover, the type of institution (public or private) was found to have no effect on the level of schooling in the second generation of Chinese and Filipino migrants.

The study by Chae and Glick (2019) deserves a mention, as it is one of the few studies that have compared the selectivity of internal migration and its association with schooling in three African countries. They found a positive selectivity of migrants in terms of school enrolment.

The consequences of spatial mobility are not uniform and depend on the reasons that led to the move, the conditions at the place of origin and the place of destination, and the length of time spent at the destination. In a study on Turkey, the relationship between rural-urban migration and school dropout was found to vary depending on the place of destination (Goksen; Cemalcilar, 2010). The effect of migration from rural areas to Istanbul was negative and significant, but the effect was not significant when the areas of origin and destination were similar. In addition, the social capital available at the destination, measured by the student-teacher relationship, increased the probability of migrants to Istanbul staying in school (Goksen; Cemalcilar, 2010).

The length of stay at the destination is also associated with the differences in the educational results of migrants and non-migrants. A study on international migration between the USA and Mexico found that recent immigrants had lower school attendance in both countries. While migration was shown to delay or reduce school attendance, this disadvantage was not observed for older migrants (Glick; Yabiku, 2016).

Associated with the length of stay, another important mechanism that can lead to either a negative or positive migration effect is the difference in school quality. In a study of international immigrants in the United States, school quality in the country of origin, as measured by large-scale assessments, was found to have a substantial effect on immigrant learning, defining the contours of the adaptive process (Bozick; Malchiodi; Miller, 2016). While immigrants from countries with worse schools than those in the USA tended to benefit from a longer period of residence in the destination country, this was not the case for immigrants from countries with better schools, whose educational outcomes sometimes even worsened depending on the length of stay in the destination country (Bozick; Malchiodi; Miller, 2016).

In the case of internal migration, the differences between schools also affect the variation in students' results after migration. Wang *et al.* (2017) suggested that, for the Chinese context, it was not the disruption of social relations that negatively affected students' results, but rather the environment and the quality of the schools at the destination. In contrast, also for the Chinese context, Xu *et al.* (2018) found positive effects of migration on school results when controlling for differences in school characteristics. The positive effects were associated with improved parental socio-economic status. However, migrant children had lower aspirations and higher anxiety levels, even when they had similar or better results than non-migrants.

In summary, the effect of migration on school results varies mainly according to the characteristics of the place of origin and the place of destination for residential moves, the curricular characteristics and the quality of the schools at the origin and the destination for school moves, the characteristics of the students' relationships at the origin and the destination, and the length of stay at the destination. In addition, there may be both positive and negative selectivity of the students who move, which is an aspect that is relatively neglected in studies of Brazil, largely due to the lack of longitudinal information.

Indeed, there is a scarcity of studies evaluating the relationship between migration and the educational outcomes of children and teenagers, both in Brazil and in Minas Gerais in particular. One of the few pioneering studies on this association in Minas Gerais is by Miranda-Ribeiro (2001). The author found that in areas of Minas Gerais that were subject to intense migratory flows, there were important changes in the distribution of school enrolment by grade and age. Minas Gerais natives had lower levels of efficiency in school entry than migrants, with recent migrants having higher levels than older migrants, except in Belo Horizonte. However, this difference was not necessarily a consequence of migration, but may simply represent the selectivity of migrants, as the author herself pointed out in the conclusion of the article.

In a more recent study, Rigotti, Signorini, and Hadad (2020) evaluated the differences in migratory flows in conjunction with the school flow of Brazilian high school students, using the same longitudinal database of students used in this work. The authors pointed out that short-distance migrations during the transition from primary to secondary school suggest an investment in education, while long-distance movements may be the result of family migration (Rigotti; Signorini; Hadad, 2020).

Ensuring that all children receive basic education is still a challenge in Brazil, although it is a right established by the Federal Constitution (Brazil, 1988). Barros *et al.* (2021) projected that 17% of Brazilians aged 16 in 2018 will not complete secondary education by the time they turn 25 in 2027. Failure to complete basic education leads to losses in health, well-being, and individual productivity, as well as negative externalities for the entire population (Barros *et al.*, 2021). Despite universal access to primary education, problems related to promotion, retention, dropout, and completion of basic education persist. Consequently, this study uses a measure of school flow as an indicator of educational outcomes, classifying them according to their regularity. Furthermore, the literature shows that migration can have a significant effect on student performance, regardless of the measure used (proficiency, school flow, educational expectations, or children's mental health), and even after controlling for school characteristics and the areas of origin and destination. The following section describes the database used and how student selectivity is treated. A school flow indicator is used to assess the performance differences in the educational trajectories of a cohort disaggregated into migrants and non-migrants during the 2008-2019 period by municipality in the state of Minas Gerais.

Data and methods

Data

This study used school flow data from the longitudinal monitoring of students in the school census. Until 2006, the data collected in the school censuses carried out every calendar year had the school as the unit of information. Data on enrolments, classes,

schools, and teachers were collected in aggregate form. From 2007 onwards, the school censuses were performed using students and teachers as more disaggregated units of information. This change brought significant advantages in terms of the quality of the data, as well as making it possible to monitor students and their trajectories in the educational system over time (Inep, 2011).

The change made in 2007 enabled Inep to compile the database that was used in this study to analyse school flow and student migration. The preparation of the database by Inep can be divided into four main stages: deduplication of records; standardisation of the variables and categories collected; handling of inconsistent cases; and imputation of values. This database follows students longitudinally, tracking their school flow and changes between schools for 13 years, from 2007 to 2019. Thus, we were able to follow two cohorts from the start of primary school to the end of secondary school, assuming a regular flow.

The cohort that entered the first year of nine-year primary education in 2007 is the first for which it is possible to monitor the flow throughout primary and secondary education. Soares, Alves, and Fonseca (2021) pointed out that later cohorts may have better quality data for two reasons: improved recording due to more experience with the new collection methodology, and the phasing out of eight-year primary education.[1] The choice of the state of Minas Gerais as the geographic focus of this study was related to this second reason, as the state began implementing nine-year primary education in 2004.[2]

We chose to analyse the 2008 cohort because it is the second and last cohort for which it is possible to follow students with a regular flow until they finish secondary school with the data available. The cohort is defined by students who were born between 1 July 2001 and 30 June 2002[3] and were enrolled in the first year of nine-year elementary school in 2008 in Minas Gerais.

The database used includes variables on the individual and enrolment characteristics of each student in each calendar year, and the characteristics of the school in which the student was enrolled. With regard to the individual characteristics of the students, in addition to the date of birth used to identify the members of the cohort, we used the variables of gender, with the categories "male" and "female", and race/colour ("undeclared", "white", "black", "brown", "yellow", and "indigenous"). With regard to enrolment characteristics, we used the variables relating to school grade and the school flow, as explained below.

The categories for eight- and nine-year primary education were made compatible using nine-year primary education as a reference. As this study focuses on the regularity of the

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[1] Federal Law n. 11.274, of 6 February 2006, amended the National Education Guidelines and Bases Law, extending the duration of primary education to nine years, with the inclusion of six-year-olds. Although enacted in 2006, Federal Law n. 11.274 set a deadline of 2010 for the implementation of the extension.

[2] Decree n. 43.506, of 6 August 2003, institutes nine-year elementary education in Minas Gerais state schools. Resolution n. 430, of 7 August 2003, defined norms for the organisation of nine-year elementary education, making it possible for the state's municipalities to implement it.

[3] Minas Gerais used the last day of June as the enrolment criterion until the STF decision (ADPF 292 of 2018), which established that all states should follow the date set by the National Education Council.

school trajectory, we considered only enrolments in consecutive schooling grades from primary to secondary school.

The school flow variable indicates the category to which the student is assigned based on their enrolment in two consecutive years. In the case of regular primary and secondary education, the possible values for this variable are promotion, retention, evasion, or migration to Youth and Adult Education (EJA).

The school municipality variable was used to identify migrant students, according to the definition and assumptions presented in the next subsection.

The six-year-old population of Minas Gerais in 2008 was estimated at 305,649 by the IBGE Population Projection (2018 edition) and at 289,315 by the National Household Sample Survey (PNAD). According to Inep's longitudinal database, there were 292,643 students of this age in 2008, a value between the two available estimates. Therefore, it may be assumed that practically all six-year-olds in Minas Gerais were enrolled in school. However, even though Minas Gerais is one of the pioneering states in implementing nine-year primary education, 20,293 (6.9%) of six-year-olds in the state were enrolled in grades other than the first grade of primary education. Given the delimitation of the cohort, we selected only the 272,350 students enrolled in first grade.

Following the suggestion of Soares, Alves, and Fonseca (2021), two categories of students were not included in the study of the 2008 cohort: students declared as deceased during the period, and students in school years incompatible with their age. Students who showed inconsistent enrolment in any year of the analysed period were excluded from the analysis. Of the 272,350 students, 409 (0.2%) deceased students and 7220 (2.6%) students with an age-incompatible grade were excluded.

After these exclusions, only four categories of school flow should be observed in the base: promotion, retention, dropout, and change to EJA. However, an additional 1963 (0.7%) students who had a flow other than these four options were also excluded, resulting in a cohort of 262,758 students.

Table 1 shows the absolute and relative distribution of students in the cohort before and after the exclusion of certain cases. The "undeclared" race/colour category is the only one over-represented in the group removed from the analysis. However, the distributions by sex and race/colour of the cohort before and after exclusion are similar. After considering the size and the specificities of the group of 818 (0.3%) students assigned to the race/colour categories of yellow and indigenous, we recognised that studying these students would require a specific approach, and therefore did not include them in our analysis.

TABLE 1
Distribution of students in the selected cohort before and after the exclusion of inconsistent cases from the analysis, by sex and race/colour
State of Minas Gerais – 2008-2019

Sex and race/ colour	Pre-exclusion cohort		Total students excluded		Post-exclusion cohort	
	N	%	N	%	N	%
Total	272,350	100.0	9,592	100.0	262,758	100.0
Sex						
Female	138,684	50.9	5,140	53.6	133,544	50.8
Male	133,666	49.1	4,452	46.4	129,214	49.2
Race/colour						
Undeclared	34,938	12.8	1,460	15.2	33,478	12.7
White	89,015	32.7	3,048	31.8	85,967	32.7
Black	17,621	6.5	581	6.1	17,040	6.5
Brown	129,896	47.7	4,442	46.3	125,454	47.8
Yellow	549	0.2	27	0.3	522	0.2
Indigenous	331	0.1	34	0.4	297	0.1

Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).

Concepts, assumptions, and measures

When studying migration, it is necessary to delimit the period used, and to specify which types of spatial mobility can be considered migration. According to the UN Manual VI, a migrant is a person who moves from their usual place of residence across a predetermined region or distance (United Nations, 1970). In this study, the annual period was used as the time delimitation and the municipality was used as the geographical unit. In other words, students who changed their place of residence by moving to another municipality between two calendar years were classified as migrants.

The school municipality variable was used to identify migrant students, based on the assumption that students live in the municipality where they attend school. Therefore, students were classified as migrants when they enrolled in a school located in a different municipality than that of the school they were enrolled in during the previous year. This assumption could lead us to classify as migrants students who commuted on a daily basis from their home to a school in another municipality; a practise that is probably more common in municipalities bordering large urban centres. Despite this limitation, other studies have used the same database and the same assumption to study student migration, while emphasising the need for caution in interpreting the results (Rigotti; Hadad, 2018; Rigotti; Signorini; Hadad, 2020; Rigotti; Castro; Hadad, 2021). In order to simplify the text and ensure greater fluidity in reading, migrations between a given year *t* and the following year *t*+1 are referred to as migration in *t*. In addition, as the migrations considered were changes of residence between two fixed periods (the beginning of each year), the migrations may have occurred either during the school year or between the end of the school year and the beginning of the following school year.

The strategy we used to analyse the relationship between migration and school flow was to compare the proportions of students with a regular flow up to the calendar year of the first migration among migrants and non-migrants, and to examine the variation in these proportions after the calendar year of the first migration.

The technical note prepared by Inep (2017) specifies that "the transition rates (school flows) for a given school grade are calculated considering the proportion of students in each of the situations [promotion; retention; dropout; and migration to EJA]". For a summary measure of a regular educational trajectory, only the promotion rate was used, measured by the proportion of students who, at the start of the school year, enrolled in the grade following the one in which they were enrolled the previous year.

The proportion of regular students in 2008 is equal to one, a direct consequence of the cohort delimitation. Therefore, equation (1) shows the formula for calculating the proportion of regular students for a calendar year t equal to or greater than 2009. For years greater than or equal to 2009, the proportion of regular students corresponds to the promotion rate of regular students accumulated up to the previous year. The product is made up to t-1 because regular students in year t correspond to those who were regular and were promoted between the current and the previous calendar year, remembering that the school flow classification considers student enrolment in years t and t+1.

$$proportion\ of\ regular\ students_t = \prod_{i=2008}^{t-1} promotion\ rate_i^{regular}\ for\ t \geq 2009 \qquad (1)$$

Where:

proportion of regular students$_t$ = proportion of students with regular flow in calendar year t;

promotion rate$_i^{regular}$ = promotion rate of regular students in calendar year i.

The rates used to calculate the proportions shown in equation (1) were standardised to allow for the comparison of crude measures between two groups with different compositions. Standardised promotion rates were calculated for migrants and non-migrants, according to equation (2), using the average composition of the groups as the standard. The groups correspond to combinations of the variables sex and race/colour.

$$promotion\ rate_t^s = \sum_{g=1}^{\infty} promotion\ rate_{g,t} \cdot c_g^s \qquad (2)$$

Where:

promotion rate$_t^s$ = standardised promotion rate by sex and race/colour of students with regular flow in calendar year t;

promotion rate$_{g,t}$ = promotion rate for regular students in group g and year t;

c_g^s = standard composition of group g;

We used the proportion of students with a regular flow in the year of their first migration to assess whether there was selectivity among migrants compared to non-migrants.

The selectivity of migration was identified using the ratio between the proportion of students with a regular flow for migrant and non-migrant groups, equation (3). The ratio

considers in the numerator the proportion of regular students in the calendar year who migrated for the first time in the calendar year *a*, and in the denominator the proportion of students who did not migrate during the period analysed. Selectivity is assessed using the proportion of regular students in the year of their first migration, i.e., *t = a*. If the ratio is greater than one, there is positive selectivity in migration, since the proportion of regular migrant students is greater than that of non-migrants; if the ratio is equal to one, there is no selectivity in the school flow; and if the ratio is less than one, selectivity is negative. In addition to assessing selectivity in the year of migration, analysis of the ratio between proportions for calendar years *t* less than *a* allows us to identify how selectivity varied up until the year of the first migration.

$$regular\ ratio_t = \frac{proportion\ of\ regular_t^{migrants\ in\ a}}{proportion\ of\ regular_t^{non\text{-}migrants}} \tag{3}$$

In the year after migration, i.e. for *t > a*, if the ratio is lower than the ratio observed in *t*, there is negative variation in the results; if the ratio remains constant, there is no variation; and if the ratio increases, there is positive variation in the migrants' educational results after the move.

The next section presents and discusses the main results found, preceded by an analysis of the proportion of migrant students in the cohort studied and the number of moves made by migrants.

Results and discussion

One possible reason for the scarcity of studies assessing the influence of migratory movements on educational outcomes is the perceived low prevalence of school-age migrants. Even if there is a relationship between migration and educational outcomes, if the proportion of migrants is small, this relationship would be weak at the population level. Therefore, before describing the migratory movements, we analysed how many students migrated between 2008 and 2019.

Table 2 shows the proportion of students who changed schools and migrated at least once between 2008 and 2019, by gender and race/colour, attributes that recur in the literature on this topic (Ernica; Rodrigues; Soares, 2025). Students who were enrolled in the same school throughout the period are counted in the "no movement" column. The "within municipality" column represents students who were enrolled in at least two different schools during the period, but in the same municipality. Students who were enrolled in schools in at least two different municipalities between 2008 and 2019 are classified as migrants, and are counted in the "inter-municipality" column.

TABLE 2
Distribution of students in the selected cohort, by intra-municipal and inter-municipal moves, according to sex and race/colour
State of Minas Gerais – 2008-2019

Sex and race/colour	No movement		Within municipality		Inter-municipality		Total
	N	%	N	%	N	%	
Total	24,571	9.3	165,199	63.1	72,169	27.6	261,939
Sex							
Female	13,309	10.0	83,809	62.9	36,041	27.1	133,159
Male	11,262	8.7	81,390	63.2	36,128	28.1	128,780
Race/Colour							
Undeclared	3,867	11.6	19,624	58.6	9,987	29.8	33,478
White	7,786	9.1	55,761	64.9	22,420	26.1	85,967
Black	1,626	9.5	11,147	65.4	4,267	25.0	17,040
Brown	11,292	9.0	78,667	62.7	35,495	28.3	125,454

Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).

Changing schools is the predominant pattern, with only 9.3% of students remaining in the same school throughout the period. While more than 90% of the students in the cohort changed schools at least once during the period, 165,199 students (63.1%) moved only within the municipality, and 72,169 (27.6%) migrated.

In Brazil, the division of competences between municipalities, states, and the union, as well as the different levels of education offered, make it necessary for students to change schools. The municipalities are responsible for early childhood education and primary education, while the states are responsible for guaranteeing universal primary education and providing secondary education. For this reason, it is common for schools to offer only one level of education and for students to have to change schools and educational systems between levels. During the period studied, 60.8% of schools offered only one level of education, and only 12.3% of schools offered all three levels (first years of primary, last years of primary, and secondary).

Among the students who migrated at least once between 2008 and 2019, there are no relevant differences by gender or race/colour. The proportion of female migrants is higher, but by just one percentage point. In terms of race/colour, migration is less common among black students than white students, but brown students are more likely to migrate than white students.

There is evidence that the more moves students make, the greater the decline in their educational outcomes (Coleman, 1988; Astone; McLanahan, 1994). Therefore, in addition to assessing the prevalence of migrant students, we analysed the prevalences disaggregated by the number of moves made, which is possible with longitudinal data.

The pattern of the relative distribution of migrant students by the number of migrations is similar for all the analysed groups (Table 3). The proportion of students decreases as the total number of migrations increases. Approximately 47% of the migrants moved only once and 90.5% moved up to three times.

TABLE 3
Distribution of migrant students in the selected cohort, by sex and race/colour, according to number of migrations
State of Minas Gerais – 2008-2019

In percentage

Number of migrations	Race/colour – sex female				Race/colour – sex male			
	Undeclared	White	Black	Brown	Undeclared	White	Black	Brown
1	53.1	48.2	44.4	44.7	52.4	49.8	46.1	45.2
2	27.4	31.1	33.5	33.5	27.2	30.4	33.2	32.0
3	11.0	11.5	12.2	12.2	12.1	10.9	11.4	12.3
4	5.2	5.5	6.0	5.8	5.2	5.3	5.9	6.6
5	2.2	2.3	2.3	2.3	2.1	2.2	1.9	2.4
6	0.8	0.9	0.9	0.9	0.7	0.8	1.1	1.1
7	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3
8+	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).
Note: The table shows the percentage distribution of students in each group by the total number of migrations made, such that each column in the table adds up to 100% of the students in that group.

In short, student migration was a frequent event, which reinforces the importance of studies that assess the relationship between migration and school flow. In terms of frequency, it was common for students to undertake more than one migratory movement during their school years. There are no substantial differences by gender or race/colour in either the proportion of migrants or the number of migrations.

Following a cohort means that there is a direct and exact relationship between the calendar year and the age of the students. Consequently, assessing emigration rates by calendar year is equivalent to analysing the age pattern of migrants. The age pattern reflects the relationship between movements and life course transitions (Rogers; Castro, 1981), and helps researchers to develop hypotheses about the purpose of migration, which is generally associated with movement selectivity.

Figure 1 shows student outmigration rates by gender, race/colour, and year from 2008 to 2018. In addition to the direct relationship between the year of emigration and the age of the student, there is also an exact relationship with the school grade in the case of students with a regular flow. The curves shown in the figure have a clear and similar pattern for all groups. In general, there is almost no variation in migration rates between the years, except for two peaks, with the first being in 2012 and the second being in 2016. These two years correspond to the transitions between school levels for students with a regular flow. The transition from the first to the last years of primary school takes place between 2012 and 2013 for regular students. Thus, the students in the cohort should have finished primary school in 2016 and enrolled in secondary school in 2017. Migration between educational levels may also be related to the availability of education in the municipalities. While 93.5% of the municipalities had more than one school offering the first years of primary education, this percentage dropped to 69.2% for the final years. At the secondary level, less than half of the municipalities (47.6%) had more than one school offering secondary education.

The second peak, in 2016, is substantially higher than the first, and is at different levels depending on the race/colour of the student. With the exception of 2016, the rates for black students are very close to those for white students. In 2016, despite an increase in the rates for black students, the variation for white students is greater, causing the curves to diverge. The years in which the peaks are located and the differences by gender and race/colour point to a probable increase in migration for the purposes of studying in 2016, with the aim of preparing for the university entrance exam, as has also been suggested by Rigotti, Signorini, and Hadad (2020).

FIGURE 1
Student outmigration rate in the selected cohort, by gender and race/colour
Stet of Minas Gerais – 2008-2018
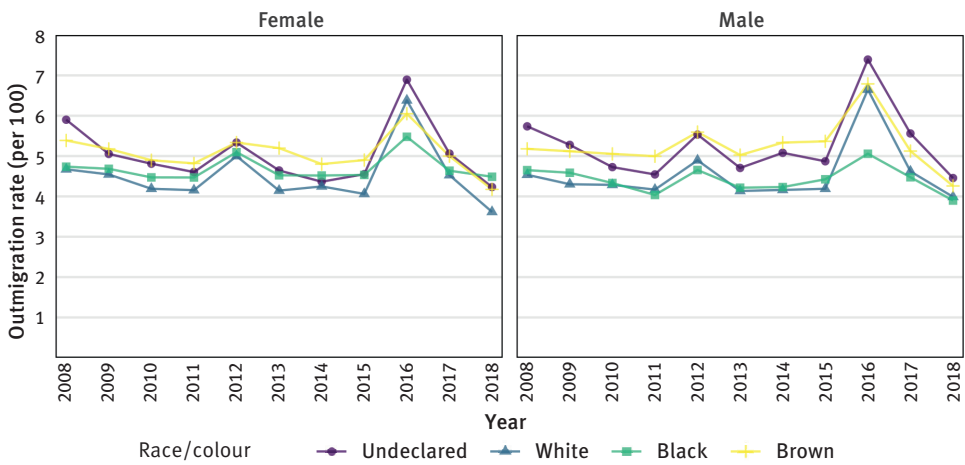
Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).

Figure 2 shows the proportions of migrant and non-migrant students with a regular flow in each calendar year. Migrant students have a more irregular school flow, and the difference between migrant and non-migrant students increases over time. In 2019, at the end of the period, 51% of non-migrants have reached the third year of secondary school without repeating or drop out, compared to 45% of migrants.

FIGURE 2
Standardised proportions of students in the selected cohort with regular flow of migrant and non-migrant in each calendar year
State of Minas Gerais – 2008-2019
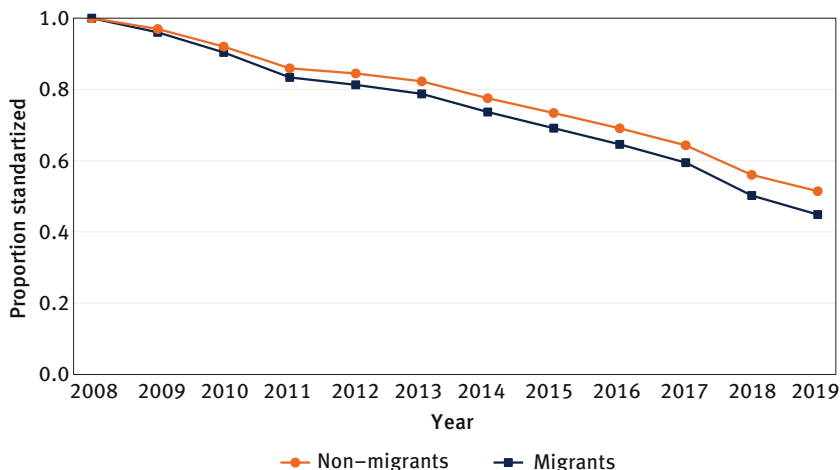
Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).

The difference found is consistent with the hypothesis of a negative relationship between migration and school outcomes (Pribesh; Downey, 1999; Goksen; Cemalcilar, 2010; Glick; Yabiku, 2016). However, without taking the year of migration into account, it is not possible to determine whether there is a difference before migration, indicating possible selectivity, or whether there is a negative variation in the school flow after migration. By comparing migrant students based on the year of their first migration, it is possible to separate selectivity from variation. In addition, although the proportions allow for an analysis of the irregularity in the school flow, the ratio between the proportions is more appropriate for comparing the differences between the groups. Figure 3 shows the ratios between the proportions for migrant and non-migrant students (reference group) by year of first migration and number of migrations.

FIGURE 3
Ratio between standardised proportions of migrant and non-migrant students in the selected cohort with regular flow, by number of migrations, based on the year of the first migration
State of Minas Gerais – 2008-2019
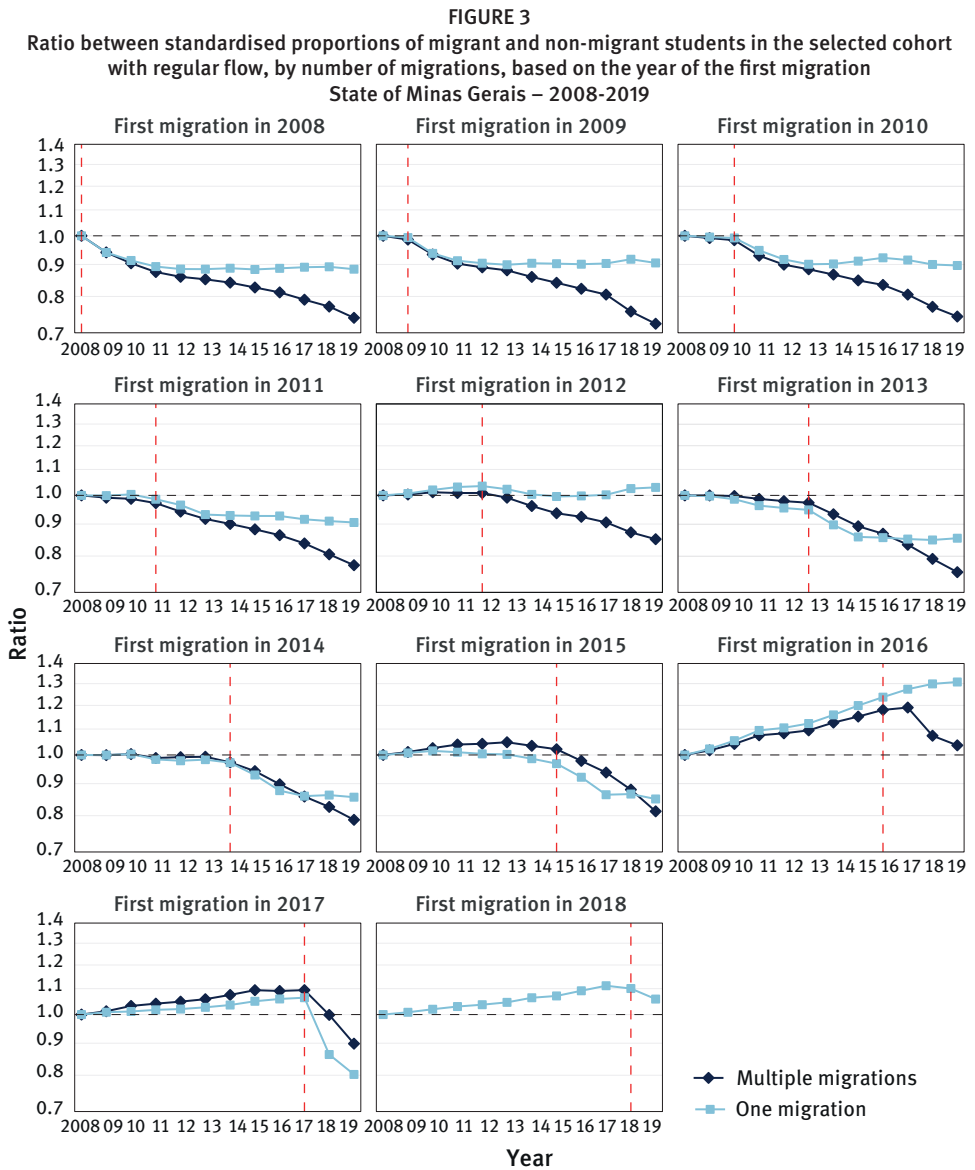
Source: Prepared with longitudinal data from the school census (Inep, 2008-2019).
Note: Each panel corresponds to the ratios by the year of the first migration (dashed red vertical line).

The analysis of regular student proportion ratios can be divided into three groups according to the time of the first migration: during the first or last years of primary school; during the transition between school levels; or during secondary school.

In the case of students who migrated for the first time between 2008 and 2011, and thus during the first years of primary school, or between 2013 and 2015, and thus during the final years of primary school, the ratio is close to one until the year of their first migration.

In these cases, there is no selectivity related to the school flow. For students who migrated only once, the ratio decreases in the two years after migration and tends to stabilise from the third year onwards. At the end of the period, the proportion of students who migrated only once with a regular flow is about 0.9 times the proportion for non-migrant students if the move occurred in the first years, and is 0.85 times the proportion if the move occurred in the last years. This variation immediately after migration, which decreases or disappears over time, is consistent with the findings of Glick and Yabiku (2016). In the case of a cumulative measure, even if the rates are different only in the year of migration, the difference remains until the end of the period.

With regard to the first group analysed, the only exception is that of the students who migrated for the first time in 2015 and migrated more than once. The pattern of this group is similar to that of students who migrated during secondary school. In the case of these students, if the first migratory movement was in 2015, the second movement occurred in the transition or during high school, between 2016 and 2018. Therefore, the positive selectivity found in the second migratory movement may be for the purposes of studying, which has not received much attention in the national and international literature.

The relationship found for students who migrated for the first time during the transition between levels, whether from the first years to the last years of primary school in 2012 or from the last years of primary school to secondary school in 2016, is different from that observed for the other movements. Not only there is no substantial postmigration variation for students who migrated only once, but there is also a high positive selectivity for students who migrated during the transition to secondary school.

In 2012, the ratio of students who migrated only once is slightly higher than 1.0. As was already mentioned, for the regular students in the cohort, this year corresponds to the transition between the first and the last years of primary school. For the group who migrated in 2012 and only once, there is no notable difference in the proportion of students with a regular flow in 2019.

Given the limited assumption that students live in the municipality in which they attend school, part of the observed migration peak may be due to students changing to a school in a neighbouring municipality. It is reasonable to assume that this type of movement occurs during the transition between educational levels, and that the proportion of students who commute to study increases as they get older.

In the case of students who migrated for the first time during secondary education, there is positive selectivity in both 2017 and 2018. However, at the end of the period, the proportion of students with a regular flow is lower for migrants than for non-migrants in 2017, and is similar for migrants and non-migrants in 2018.

The proportion of students with a regular flow who migrated in 2016 and only once is 24% higher than that of non-migrants in 2016, indicating a high selectivity of migration. Moreover, the ratio for this group continues to increase after migration, despite a reduction

in the slope. Assuming that the main purpose of the students who migrated in 2016 was to invest in their studies, whether they stayed in their destination would depend on the success of this investment. Therefore, in 2017, some of these students may have made a return migration because their first migration was unsuccessful. The return migration of unsuccessful students would explain the low variation in the grade promotion of those who migrated only once.

Conclusions

In order to contribute to the debate on the relationship between migration and education, we analysed the migration and school flow of a cohort of students from Minas Gerais who were enrolled in the first year of primary school in 2008. The right to attend compulsory basic education between the ages of four and 17 is guaranteed by the Brazilian Federal Constitution (Brazil, 1988, art. 208). However, in addition to learning inequalities, there are still inequalities in school flow and the completion of basic education, especially in terms of grade retention (Barros, 2021; Soares; Alves; Fonseca, 2021).

Based on the analysis carried out in this study, it was possible to conclude that migration had a negative relationship with the school flow for most of the years in the analysed period. The negative variation in the outcome was observed immediately after the move, and tended to decrease over time. This result is consistent with the hypothesis of broken relationships and difficulty in building social capital proposed by Coleman (1988), and is supported by some of the literature on the subject (Goksen; Cemalcilar, 2010). The negative variation in school outcomes could be related to the loss of ties that students had in their region of origin and the difficulties they faced in building new relationships in the destination. Another mechanism that could explain the variation in outcomes after migration is the difference between the quality of the schools in the origin and the destination. However, the effect of the difference in school quality tended to increase over time (Bozick; Malchiodi; Miller, 2016), and the results point to a variation immediately after the migration that decreased over time.

While previous studies on the relationship between internal migration and educational attainment have found both negative (Pribesh; Downey, 1999) and positive selectivity (Chae; Glick, 2019), in the case of the cohort studied, no selectivity related to school flow was found when the move occurred within the same educational level, especially within the first or final years of primary school.

Moves made in the years corresponding to transitions between school levels showed a different pattern of selectivity and variation than moves made in other years, especially in the case of the transition to secondary school. The proportion of regular students in the cohort that migrated for the first time in 2016 was 24% higher than that of non-migrants. In addition to this large difference in the regularity of the accumulated flow up to the year of migration, after the move, the promotion rate of students who migrated only once

remained higher than that of non-migrants. The selectivity, the lack of negative variation, and the peak in the migration rate in that specific year suggest that the purpose of such moves was to invest in education (Rigotti; Signorini; Hadad, 2020), although the data do not allow us to test this hypothesis.

In general, migration requires resources and tends to be positively selective. Migration to invest in studies would require more resources from the family, who would have to support the student in another municipality. For this reason, the correlation between socio-economic status and race/colour (Frio; Fontes, 2018), and the observation that white students show a higher migration peak than black and brown students in the transition to high school (Figure 1), reinforce the hypothesis that students migrate to invest in education. However, studies with a different approach and database are needed to test this hypothesis. In this sense, a more detailed analysis of the differences between the municipalities of origin and destination in terms of the availability and the quality of schools could shed light on the question of whether teenagers are migrating in search of better educational opportunities.

This study aimed to contribute to the debate on the relationship between migration and educational outcomes by providing evidence of selectivity and variation in the regularity of school trajectories by year of migration. Despite the evidence of selectivity in flows and disadvantages for migrant students, the literature suggests that caution should be exercised before making generalisations, as situations can vary greatly depending on the socio-economic and the regional context and the characteristics of the schools themselves, as well as on individual and family characteristics. We hope that the results presented in this paper will motivate other studies on the important relationship between migration and education, which has so far been little explored in the Brazilian context. Furthermore, the size of the relationship found in this study highlights the need to consider migration as an explanatory variable in studies of educational outcomes.

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Resumo

Migrações e fluxo escolar da coorte de estudantes de 2008 a 2019, em Minas Gerais

A migração dos estudantes é um importante fenômeno que pode ter implicações para o resultado educacional. Poucos estudos avaliaram a influência da migração na escolaridade dos indivíduos, sobretudo no contexto dos países em desenvolvimento. Este trabalho tem como objetivo analisar a relação das migrações com o fluxo escolar da coorte de estudantes de Minas Gerais que estavam matriculados no 1º ano do ensino fundamental, em 2008. Utilizaram-se dados longitudinais preparados a partir dos censos escolares, de 2008 a 2019, para comparar a regularidade do fluxo escolar dos estudantes migrantes, por quantidade de migrações, com a dos não migrantes. Foram encontradas baixas diferenças na regularidade de fluxo escolar entre migrantes e não migrantes antes da migração. Por outro lado, o fluxo escolar de migrantes se torna mais irregular após o movimento, exceto para migrações realizadas em transições de níveis escolares. No caso de migrações na transição para o ensino médio, foram encontradas alta seletividade positiva antes da migração e baixa variação após. Isto indica que a migração

pode ter como objetivo o investimento em educação. Os resultados evidenciam a necessidade de se considerar a migração em estudos sobre resultados educacionais e os ganhos de uma análise longitudinal para os estudos demográficos.

Palavras-chave: Migração. Fluxo escolar. Minas Gerais.

Resumen

Migración y flujo escolar de la cohorte de estudiantes 2008-2019 en Minas Gerais

La migración de estudiantes es un fenómeno importante que puede tener repercusiones en los resultados educativos, pero pocos estudios han evaluado la influencia de la migración en los resultados educativos de las personas, especialmente en los países en desarrollo. El objetivo de este artículo es analizar la relación entre la migración y el flujo escolar de la cohorte de estudiantes de Minas Gerais que se inscribieron en el primer año de la escuela primaria en 2008. Se utilizan datos longitudinales obtenidos a partir de los censos escolares de 2008 a 2019 para comparar la regularidad del flujo de estudiantes migrantes por número de migraciones y no migrantes. Se encontraron pequeñas diferencias en la regularidad del flujo entre migrantes y no migrantes antes de la migración. Por otro lado, el flujo escolar de quienes migran se vuelve más irregular después de la migración, con excepción de aquellas que suceden durante las transiciones entre etapas escolares. En el caso de las migraciones en la transición a la educación secundaria, se encontró una alta selección positiva seguida de una baja variación después de la migración. Esto indica potencialmente que los individuos migran con el fin de invertir en su educación. Los resultados destacan la necesidad de considerar el fenómeno migratorio en estudios relacionados con los resultados educativos y los beneficios que tienen los análisis longitudinales en estudios demográficos.

Palabras clave: Migración. Flujo escolar. Minas Gerais.