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Explanatory Variables of Dropout in Colombian Public Education: Evolution Limited to Coronavirus Disease

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Abstract: Student dropout, defined as the temporary or definitive suspension of the exercise of the right to education, is attributable to multiple variables classified into individual, academic, institutional, and socioeconomic determinants which may be exacerbated in the context of the Coronavirus disease (COVID-19) pandemic. Consequently, this work aims to synthesize, from the available evidence, the behaviour and influence of the explanatory variables of school dropout in infant school, primary school and, high school in Colombia for the period 2014-2019 compared to the period 2020-2021 under the COVID-19 pandemic conditions. The research methodology consisted of a systematic review of 125 indexed articles for 2014-2019 and 32 reports related to dropout in Colombian Basic education for the 2020-2021 period. The systematic review of the 157 articles revealed that dropout was studied and explained in both time periods, mainly from the academic determinant whose most cited explanatory variables were: 'teachers', 'curriculum' and 'methodologies used'. Moreover, it could be perceived that in the period 2014-2019, the socioeconomic variable was the second dropout determinant, considering 'family income' as the most important indicator, while in 2020-2021 the "infrastructure" and the 'political environment' remained as the most dominant. Lastly, in 2020-2021, the variable 'teachers' was highly cited showing that their practice made students maintain their interest despite the physical distance.

Keywords: Basic education, documentary analysis, educational system, pandemics, school dropout.

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Introduction

The Colombian educational system is organized through the progression of educational levels, as shown in Figure 1. The instructional career considers the following levels: early education, basic education (primary and lower secondary education), middle and higher education in the national formal educational system with theoretical ages proposed for each of these levels.

The Colombian Ministry of National Education (CMoNE) considers that "school dropout can be understood as the abandonment of the school system by students, caused by the combination of factors both within and in the context of the system" (Triana, 2016, p. 31). Under the premise that the educational system offers children and adolescents access to culture, social, political, and family values which are fundamental pillars in the development of a culture of peace and contribute to the reduction of social marginalization and poverty (Bello, 2014), different types of explanatory, predictive, and prospective studies are developed for the diagnosis, treatment, and mitigation of school dropout. Analyses and studies on student dropout are conducted based on the levels of responsibility in the provision and use of the service: governmental, regional, institutional, and individual.

On the other hand, student dropout considered as a system of dynamic complexity implies several explanatory variables which act in conjunction to define and delimit the behaviour of the official educational system (Barragán, 2017). As a system, it links multiple stakeholders including the student, the teacher, and the Educational Institution (EI), as well as the context: The MEN, the society, the family, the individual, and the economic environment (Delgado, 2014 ins) which are reflected in the explanatory variables, the causes, and consequences of dropout. Regarding the main causes reported broadly by the MEN poor school performance, parental unemployment, dislike for studying and change of residence can be named as the most relevant ones (CMNoE, 2019a).

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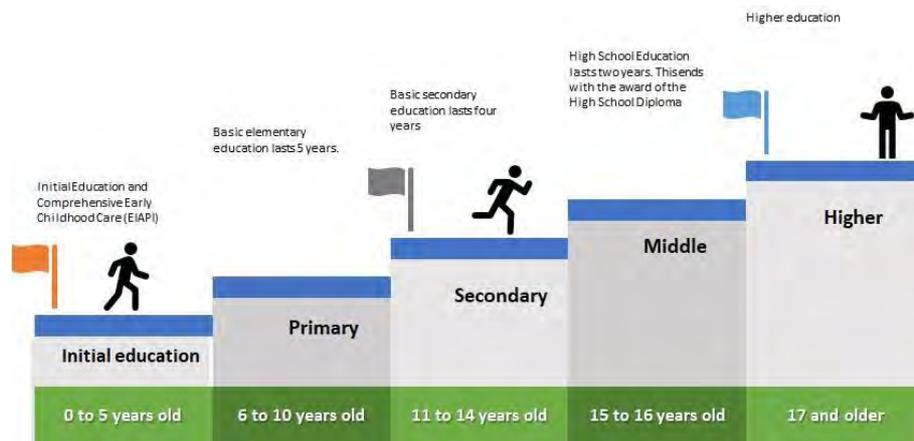


Figure 1. Organization of the educational levels in Colombia and estimated age range
 Note. Prepared by the authors based on (CMNoE, 2019b).

Considering the characteristics of student dropout, the parties involved and the features of the studies on it, as well as its dynamic complexity and the need to regularly update its evolution, this work was oriented under the following research question: In the periods 2014-2019 and 2020-2021, have the explanatory variables of school dropout in pre-school education, primary education, and lower secondary education in Colombia changed? In response, the objective of this article is to synthesize, from the available evidence, the behaviour and influence of the explanatory variables of school dropout in, primary and high school in Colombia for the period 2014-2019 in comparison with the period 2020 until 2021 (2020-2021) limited to the conditions imposed by the Coronavirus disease (COVID-19) pandemic. The temporality of the review is influenced by the declaration of national health emergency and the respective measures implemented to control the pandemic caused by COVID-19 (March 12, 2020), which resulted in a global situation characterized by the restriction and confinement.

Literature Review

Following this introduction, the theoretical framework is presented by linking the variables and determinants of student dropout and considering Vincent Tinto's description of the Integration Model, the governmental perspective, along with the one provided by the Organization for Economic Cooperation and Development (OECD) for the Colombian context, as well as the exceptional measures adopted by the national government to confront the pandemic. Afterwards, the research methodology, the selection of articles and the data processing are described. The methodology contemplated the systematic review of the scientific literature stored in 19 databases published during the periods 2014-2019 and 2020-2021 (until April).

Subsequently, the findings are presented in two dimensions: in terms of the meta-analysis of the selected articles and their citation of the determinants of student dropout and its explanatory variables. From these results, a discussion is provided based on secondary documentary sources. Finally, the main conclusions of the systematic review are summarized.

Background information revealing the explanatory variables of dropout in early education, pre-school, basic and higher education in Colombia

To understand and classify the explanatory variables of student dropout, an adaptation of Vincent Tinto's Integration Model (1993) was used, which offers a theoretical perspective accepted by the MEN as regards approaching school dropout prevention.

Vincent Tinto's Integration Model.

This work is contextualized in a theoretical adaptation of Vincent Tinto's integration model (Tinto, 1993). This model was incorporated by the MEN in the diagnosis and treatment of dropout in higher education, which is the reason why its main features were applied in this work and used to group the variables into 4 determinants: institutional, academic, socioeconomic, and individual (CMNoE, 2009). Two of them refer to factors exogenous to the educational system: individual and socioeconomic – and the other two to endogenous factors: institutional and academic since they are directly related to the provision of educational services (Forero, 2014). The model attributes student dropout and retention to the social and academic integration between students and EI. Additionally, it indicates that academic success is mediated by the support the student receives when remaining in an EI and by the institution-student adjustment (Pineda-Báez, 2010). Even though it is not an exhaustive list, Figure 2 records 44 explanatory variables of dropout in the determinants. This number of variables was determined for the inquiry conducted due to the fact that at least one citation

of the variable in the documents consulted was found when debugging the list mentioned by Tinto and adjusting it to the educational level. It is important to remark that the research is susceptible to periodic updates based on the dynamic nature of the dropout.

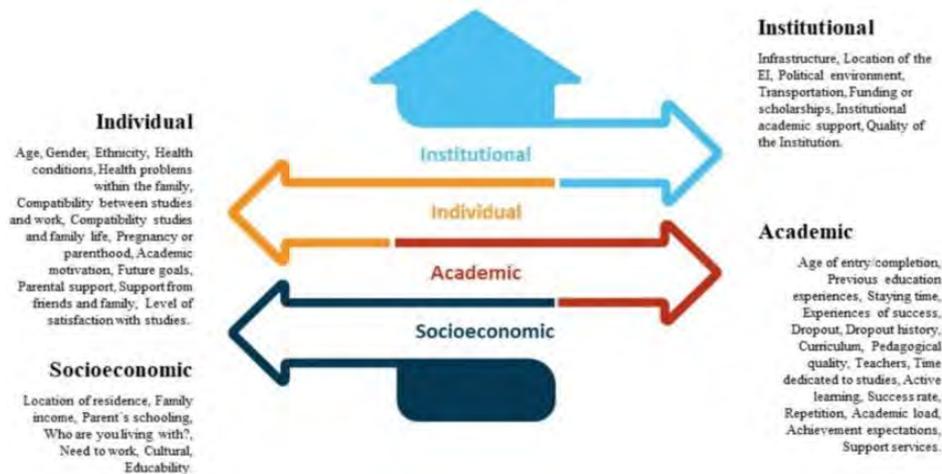


Figure 2. Determinants and explanatory variables of student dropout
Note. Prepared by the authors based on (CMNoE, 2019a).

From the perspective of the Development Plans for 2014-2018 and 2018-2022.

The National Development Plan 2014-2018 (PND2014-2018) pointed out the following characteristics as explanatory variables of student dropout: (a) Poor quality in basic and higher school education and the low results of the Program for International Student Assessment (PISA) tests as its consequence; (b) Division of study time into school days; (c) Low qualification of teachers and shortcomings in incentives to professionalize; (d) Disarticulation between the different levels and relevance of the same; and (e) Low coverage in primary and high school education in more vulnerable economic environments (Departamento Nacional de Planeación, 2015).

Meanwhile, the National Development Plan 2018-2022 (PND2018-2022), in addition to that stated in the PND2014-2018, highlighted the lack of articulation between levels and pointed out the importance of creating early alerts for the identification of individual causes, especially those associated with the gender of students (Departamento Nacional de Planeación, 2019). Although the dropout rate went from 3.6% in 2013 to 3% in 2018, the PND2018-2022, it emphasized the mitigation actions with the school-feeding scheme, infrastructure improvements, an increase in the school day, and a decrease in teenage pregnancy as strategies for student retention.

From the OECD's perspective

The OECD, on the education and competencies issue, ranked Colombia as one of the countries with the highest population of adolescents between 15 and 19 years old who are not fulfilling their educational career (36%), comparable to Mexico (35%), and highlighted the difference with OECD member countries, which average was 13%. Among the explanatory variables, the OECD underlined the age difference and the grade in which children should be enrolled, as well as grade repetition (OECD, 2016). For the first case, the report noted that "in primary school, 84% of students are enrolled in the grade corresponding to their age, compared to a Gross Enrolment Ratio of 107%, which is the largest gap among OECD countries" (OECD, 2016, p. 31). For the grade repetition rate, the report indicated that in 2012 in the countries that take the PISA tests, 41% of Colombian 15-year-olds would have failed at least in one year of education, compared to the 12% average reported by the members of the Organization (OECD, 2016).

As other variables to be considered, the OECD highlighted inequality in access to the educational system by socioeconomic origin, special educational needs, geographic location, ethnicity, and gender, attributing to them a level of incidence on children's schooling. A child from socioeconomic stratum 1 (the lowest) has an average school life of 6 years, compared to a child from stratum 6 (the highest) whose school life expectancy is at least 12.5 years, it should be noted that the average for the OECD reaches 9.53 years (OECD, 2016).

From government actions to contain the pandemic

In the framework of mandatory isolation dictated for the national territory, the MEN in several joint documents along with the Ministry of Health and Social Protection issued recommendations aimed at preventing and controlling the outbreak. In this context, academic activities needed to be reorganized with actions involving curricular, didactic, and methodological adaptation, as well as adjustments to the physical and technological infrastructure to provide adequate distance learning (Cáceres-Muñoz et al., 2020).

The main challenge lies in guaranteeing Internet connectivity for all participants in the teaching-learning process, regardless of their location, as well as the continuity of academic activities under appropriate quality conditions.

To synthesize from the available evidence the behaviour and influence of the explanatory variables of school dropout in preschool, basic and high school for the periods 2014-2019 and 2020-2021, subject to the conditions given by the COVID-19 pandemic, a systematic review was used as the main tool in the methodology to achieve the purpose of this article.

From a partial balance one year after pandemic declaration

Since the beginning of the pandemic social problems of infrastructure, food security, transportation, health, and education in developing and emerging economies have been even more accentuated. The World Bank, in its annual report, points out that by April 2020 94% of students worldwide, 1.58 billion students in 200 countries, faced closures, although the reaction to these closures depended dramatically on the economic condition of the countries, registering 86% of permanent closures in primary and secondary school services in low-income countries (Banco Mundial, 2021). United Nations (2020) estimated that at least 23.8 million more children, in pre-school to middle school, may drop out of school because of the prolongation of the pandemic. In the case of Latin American statistics still do not improve almost two years after the beginning of the pandemic.

UNESCO (2021) report indicated that dropout leaves permanent effects on all educational services in the region, given that the COVID-19 has not yet gone away and the services must face major challenges in having a student population divided between those who attend in person and those who must continue to receive the education service at a distance, maintaining a digital divide that is not yet shortened, added to a real need to design of flexible curricula, pedagogies and didactics for virtual attention in full development. An additional challenge is maintaining the student-school link from the emotional and pedagogical motivations that allow keeping the student population in schools.

School permanence is the greatest challenge of the Latin American region requiring political, social, and economic commitment to adopt strategic actions designed to meet this new reality.

In succession, all of these constitutes a pipeline of opportunity for research since it allows figuring out the dynamic of the pandemic, its consequences to provide from the knowledge effective diagnoses of the situation and to suggest measures or take actions to mitigate and remedy the effects that this has been leaving on students and in general the educational system of the region.

Methodology

The methodology consisted of three stages: (a) A systematic review was conducted using 19 databases from which multiple articles were selected; (b) The information from the systematic review was analysed for classification; and (c) The results were cross-checked with secondary sources.

Research Design

The analysis of the articles was done with the consideration of the previous works by Schmitt and Dos Santos (2013) and Munizaga et al. (2018) who conducted systematic reviews for student dropout in higher education. Schmitt and Dos Santos (2013) analysed 31 supporting articles from the Latin American Conference on Dropout in Higher Education (CLABES, by its acronym, in Spanish) and Munizaga et al. (2018) reviewed 81 articles in Spanish and Portuguese published between the years 1990 and 2016. The current work performs the systematic review circumscribed to publications between 2014-2019 and 2020-2021, including April, related to Colombia for school dropout in preschool, basic, and high school.

The 44 variables (Figure 2) were used to synthesize the evolution of the dropout adjusted to the determinants of Tinto's model to trace its dynamic behaviour in the scenario proposed by COVID-19, where the interaction between institution-teacher-student has been mediated by geographical separation and by academic and social adaptation and to telepresence.

Sample and Data Collection

The databases listed in Figure 3 were used to collect the information. The label Megabusador 2020 includes 14 databases.



Figure 3. Consulted databases
 Note. Prepared by the authors.

The search was conducted by observing the following parameters:

1. The 24 terms in Figure 4 were typed into the search applications of the databases to examine the essays titles and their abstracts.
2. The option to publish in any language was left open.
3. The search time to the period between 2014-2019 and 2020-2021; the geographical location to Colombia; the subject to education; and the type of publication to articles were limited.
4. The search equations for the period 2020-2021 were refined by adding the words COVID-19, pandemic and attrition in both Spanish and English, in order to specify the documents found to the conditions imposed for this period.
5. The documents resulting from these searches were selected based on the criteria of relevance, citation, and publication’s prestige.

Figure 4 presents the search terms used to investigate from the scientific publications how the behaviour and influence of the explanatory variables of school dropout in pre-school, basic and high school in Colombia from 2014-2019 and 2020-2021 have evolved.

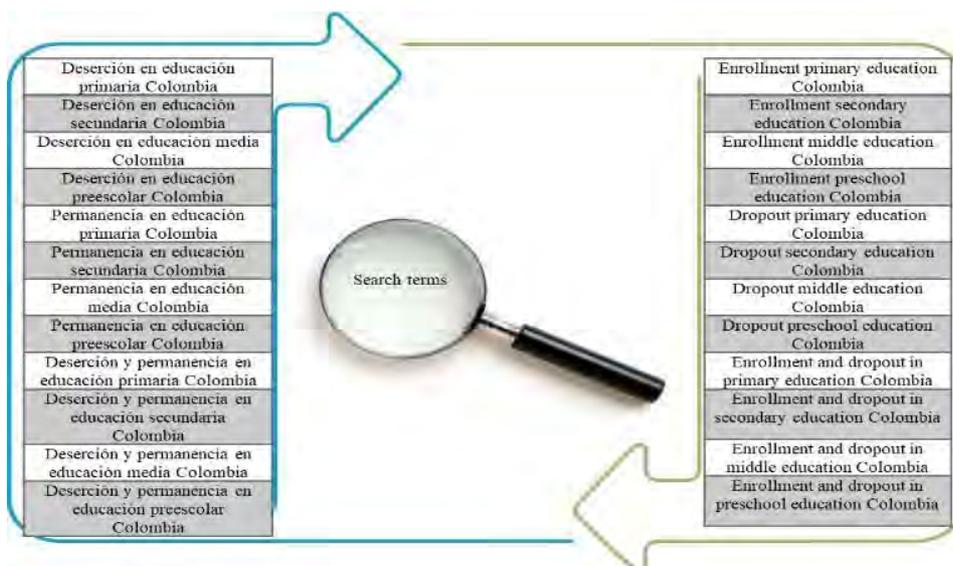


Figure 4. Search terms in databases
 Note. Prepared by the authors.

Analysing of Data

The article selection process is shown in the flowchart in Figure 5, which specifies the potentially eligible articles, those duplicated that were deleted, those filtered, the full texts for eligibility, those that were excluded, and finally those included for the two periods. The flowchart shows that in the period 2020-2021, the consultation of the databases for the 24 search terms (with the specific words: COVID-19, dropout and lockdown) initially found 70,882 records, of which 70,848 were excluded because they did not meet the search criteria. Under the criterion of free access to full text, the sample was reduced to 34 articles, the final exclusion conditions that refined the selection left as a result a sample of 32 articles for the period 2020-2021. The application of this flowchart for the period 2014-2019 culminated in 125 articles. In other words, the complete sample consisted of 157 articles.

Database Educators reference, Google Scholar, Jstor, Redalyc, Scopus, Web of Science, Megabusador 2020

Period 2014-2019 y 2020-2021

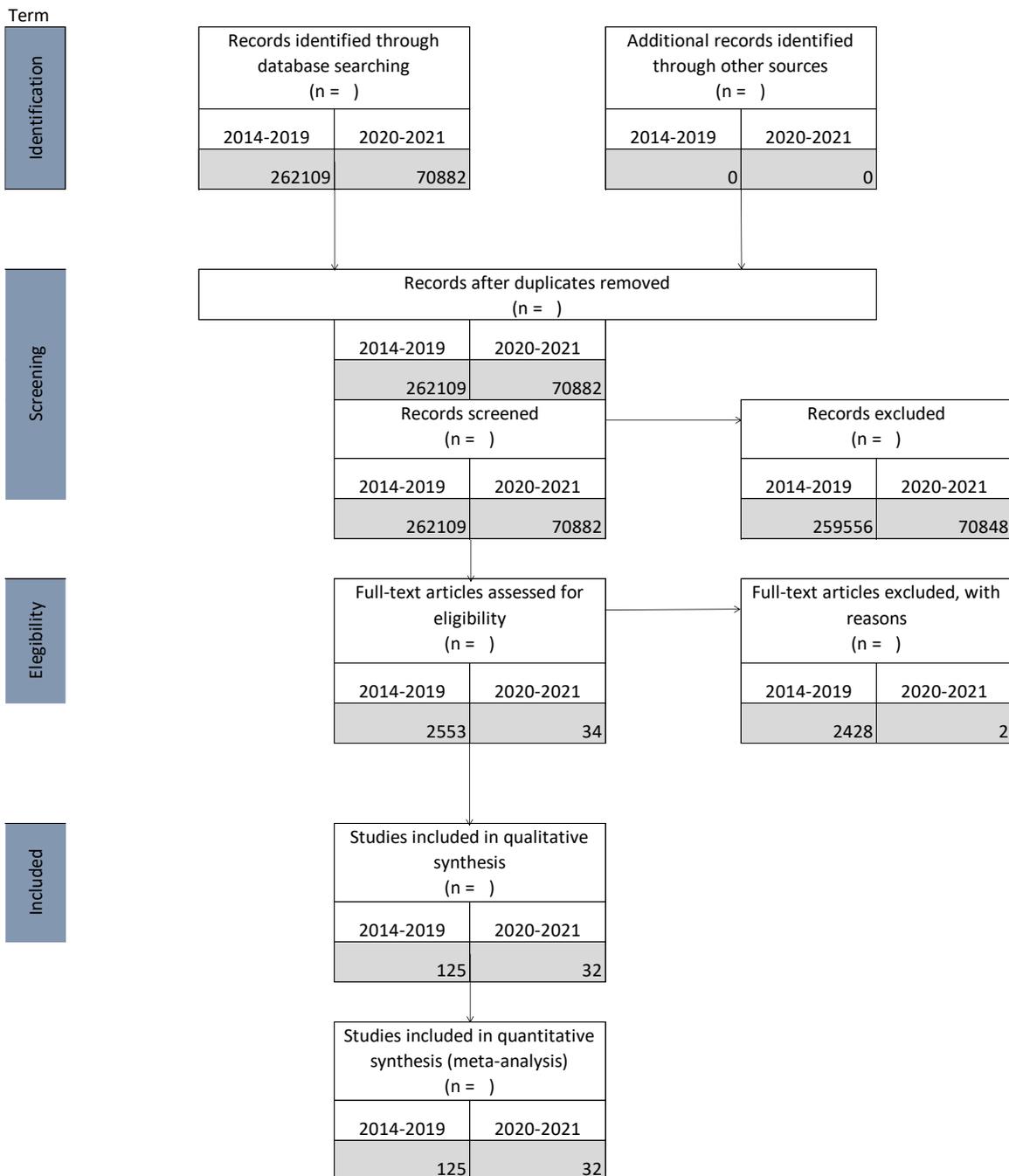


Figure 5. Flowchart for the selection of research articles for 2014-2019 and 2020-2021
 Note. Prepared by the authors based on (Consort, 2021)

As mentioned, Figure 4 illustrates the search terms used to investigate from the scientific publications how the behaviour and influence of the explanatory variables of school dropout in pre-school, basic, and high school in Colombia from 2014-2019 and 2020-2021 have evolved. 125 articles for the period 2014-2019 and 32 articles for the period 2020-2021 were represented Figure 4 and the flowchart in Figure 5. The 157 articles were distributed as follows: 0 in Educators reference, 34 in Google Scholar, 10 in JSTOR, 71 in Redalyc, 1 in Scopus and 39 in Megabusador 2020, 2 in Web of Science from Clarivate Analytics. The 157 articles were classified according to the year of publication, the methodology used in the study, the educational level to which they refer (Figure 1), the level of research conducted (exploration, characterization, survey of factors, intervention, intervention evaluation), the determinants of student dropout and the explanatory variables they address (Figure 2).

For the analysis of the selected articles, a methodological decision was made to define a citation as an indicator that identifies a variable in the text, whose associated content alludes to the meaning, value, or effect of that specific variable in the topic of retention, abandonment, or dropout in basic education in Colombia. It should be noted that some articles the addressed variables of more than one of the determinants; however, after reviewing the context, they were classified according to the presence of such variables in the abstract.

Results

The application of the research methodology produced two types of results: the first one referred to the meta-analysis of the 157 articles and the second one to the citations of the four determinants and the 44 explanatory variables of student dropout.

Basic bibliometric analysis of the sample articles

For the characterization of the sample of articles, the ordering proposed by Munizaga et al. (2018) regarding the characterization of research according to the type of study applied to dropout was considered:

- 1) Intervention: the scope proposed by the article involves carrying out concrete actions to promote access, retention, and completion of basic education in the school-age population ($n_1 = 8$).
- 2) Exploration: at a basic level, the article attempts to approach the problem and identify some of its key variables ($n_2 = 67$).
- 3) Characterization: the article identifies traits of students who drop out as a consequence of the context which surrounds them ($n_3 = 48$).
- 4) Survey of factors: the article identifies determinants and variables that influence school permanence ($n_4 = 29$).
- 5) Intervention evaluation: the purpose of the article includes proposing actions and shows the results of these actions ($n_5 = 5$).

Table 1 shows the proportions in which the articles were classified according to the determinants to which they belong, the research methodology (quali-quantitative, qualitative, and quantitative) and the type of study. Most of the studies are at a basic level of identification of variables and their immediate effects on school retention; the intervention and its results are the least addressed issues, probably due to the volume, complexity, and implementing costs required.

Table 1. Classification of articles by determinants, research methodology, and study type

Determinant	Characterization			Intervention evaluation			Exploration			Intervention			Survey of factors			
	QQ	QLT	Total	QQ	QLT	Total	QQ	QLT	Total	QQ	QLT	Total	QQ	QLT	QTV	Total
Academic	0,6	8,3	8,9	0	0	0	0	19,7	19,8	0,6	2,5	3,2	1,3	3,2	0,6	5,1
Individual	1,9	3,2	5,1	0	0	0	0	3,8	3,8	0	0	0	2,5	1,9	0	4,5
Institutional	0	11,5	11,5	0,6	0	0,6	1,3	13,4	14,6	1,3	3,8	5,1	2,5	3,2	0,6	6,4
Socioeconomic	0,6	5,1	5,7	0	0	0	0	3,8	3,8	0	0	0	0	1,9	0	1,9
Total	3,2	28	31,2	0,6	0	0,6	1,3	40,8	42	1,9	6,4	8,3	6,4	10,2	1,3	17,8

Note. Prepared by the authors. QQ= quali-quantitative, QLT= qualitative and QTV= quantitative.

Figure 6 summarizes the distribution of the number of articles selected by determinant for the two periods. For the period 2014-2019, it was found that 37.79% of the total citations explained, mainly, student dropout by academic determinant variables. Following this, the explanation focused on the socioeconomic determinant 25.59%, then on the individual determinant 24.88%, and finally, on the institutional determinant 11.74%. For the pandemic period 2020-2021, it was observed that the most cited variables referred again to the academic determinant concentrating 42.2% of the citations, followed by the institutional determinant 32.11%, the individual determinant 14.9%, at the end the socioeconomic determinant with 10.11%.

And finally, Figure 6 shows the distribution of selected articles, explanatory variables cited and total citations in each of the determinants. The respective articles for the two periods. In 2014-2019, 37.6% of the articles explain dropout from the academic determinant, while in 2020-2021 50% it is explained from the institutional one. In both periods, the variables and citations highlight the academic determinant. When the number of articles by year of publication was analysed, it was found that in 2016 it was more abundant (19.1%), followed by 2020 (16.6%).

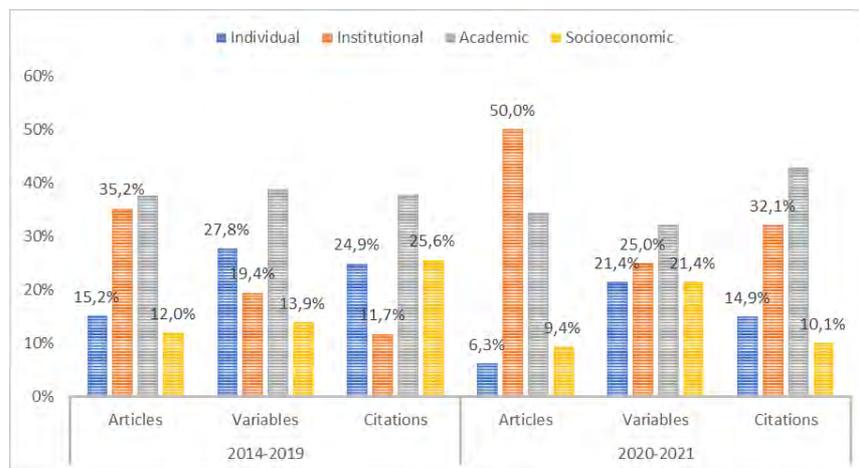


Figure 6. Distribution of articles, variables, and citations by determinant

Note. Prepared by the authors.

Subsequently, the explanatory variables grouped into the determinants of student dropout will be explored, summarizing the findings in the order of importance described for the citations.

Analysis of the Determinants and Explanatory Variables of Student Dropout

Figure 7 shows the number of citations for each determinant and each variable; the determinants (blue nodes) are surrounded by the variables that make them up. The density (number of citations) in the citation is represented by the rectangle colour. Lighter colours indicate higher density (higher citation), from which the variable "teachers" was the most cited in the academic determinant (in yellow) in the period 2020-2021. The same occurred with the variable "infrastructure" in the institutional determinant and "parent's schooling" in the socioeconomic determinant. For this period, on individual determinant variable "parental support" is particularly highlighted.

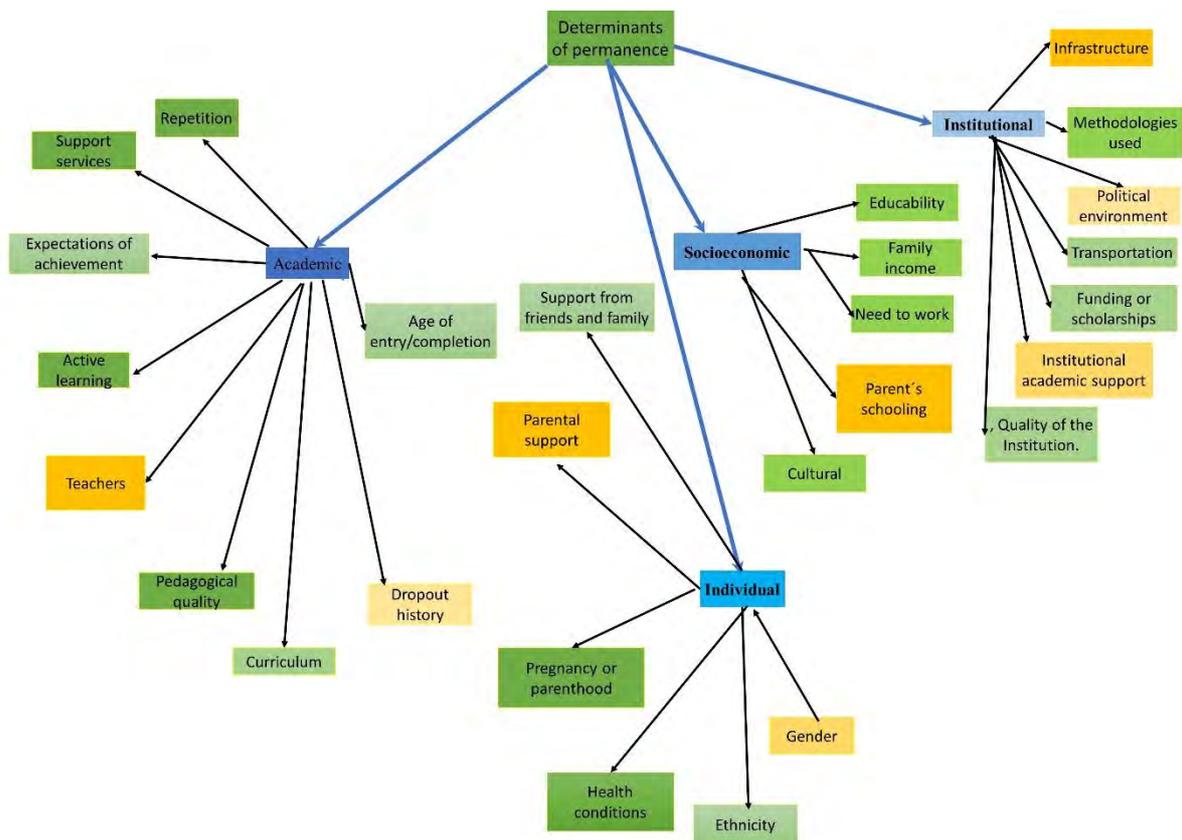


Figure 7. Determinants, citations, and relationships 2020-2021
 Note. Prepared by the authors.

Academic determinant

Figure 8 shows that the most cited variables for the period 2014-2019 were: "teachers" (34.03%), "pedagogical quality" (12.74%) and "curriculum" (10.48%). On the other hand, the least relevant were: "time dedicated to studies", "active learning", "approval" and "previous event experiences" all with 0.32% of the total citations for this determinant.

The variable "teachers" is linked to school success; hence it requires specialized professional preparation. "The quality of education is defined by teachers, no country offers better education or higher quality education beyond the quality of its teachers" (Escribano, 2018, p. 6). Considering this, teaching skills facilitate the appropriation of content and school learning through different teaching methods (González-Kopper, 2016), which added to the articulation of school activity with the analysis of everyday life, together constitute a positive strategy of student retention.

"Pedagogical quality" was understood as the quality of response provided by "teachers" to the educational needs of the student population, promoting rapprochement, interaction, dialogue and assertive communication for an appropriate classroom climate and a participatory relationship with the community (Gonzalez & Triana, 2018; Rendón, 2015).

The variable "curriculum" was important as its structure places the student as the main subject of learning, linking collaborative work and the development of competencies; and linking the principle of inclusion, evidenced for example in indigenous language education (Ducoing, 2018; Horbath, 2018).

For the period 2020-2021, the most cited variables were "teachers" (66.67%) and "dropout" (9%) (see Figure 8).

The variable "teachers" is defined by its role, education of minors and young people transmitting norms, values and knowledge in differentiated contexts that may include armed conflict, migration, domestic violence, pandemic and post-pandemic in a reality that indicates that of the 49,902 educational centres in Colombia, 93.2% have some ICT good or service, 33.9% have internet, and of the total number of educational institutions, 60% are in rural areas and with a percentage of internet connectivity of 23.3% (DANE, 2020). In addition to the above, the low competence in the qualification of teachers in ICT tools for teaching means that the sector must address and overcome the shortcomings in real time to bring face-to-face attention to the virtual.

The teaching staff will have to adjust again to the current conditions, gradual return to the classroom, where hybrid education proposals should be provided as an alternative to the situation of outbreak and resurgence of the pandemic. UNICEF points out that this work is not individual, it requires the assistance of a transdisciplinary force capable of building and guiding the educational community in the use of digital resources, motivating education, and ensuring its

culmination (Alban et al., 2020; Antoninis et al., 2020; Ballén et al., 2020 Banco Mundial., 2020; Rubio et al., 2020; Seusan & Maradiegue, 2020).

The “curricular matrix” for the pandemic period and beyond implies several challenges among which are noted how collaborative processes are key to counteract these situations, thus universities develop training programs for primary and secondary teachers in the use of virtual digital educational resources (Reimers & Marmolejo, 2021). Those programs of study started from motivations and interests of students and allow them to advance classes and build autonomous competencies in students develop prospectus for primary and secondary school teachers in the use of virtual digital educational resources that start from the motivations and interests of students and allow to advance classes and build autonomous skills in students, and to develop curricular proposals that recognize the learning achieved, expected and needed to adapt them to this new normality that implies a real hybrid education.

The variable "dropout" indicates interruption in schooling, Azevedo et al., (2020) noted that the evidence shows that any type of interruption causes learning losses and even more so in the abrupt conditions of closures due to the health emergency that added to the economic, human and social losses of the families and the change in the modality of distance presence, force the institutions to create mitigation strategies that favor the flexibility of the curriculum, evaluation and focus on the emotional and mental attention of the students. Some of them, as a result of this unusual circumstance, chose to postpone or put aside their studies for reasons related to the stress and uncertainty generated by the situation, a fact that arises as an opportunity for the institutions to prepare the return to the classroom with programs of re-adaptation to school life that implement actions that take into account the learning losses caused and that can be alleviated by adapting their programs with educational quality, mental and emotional health that seeks to reduce the already historical social inequality.

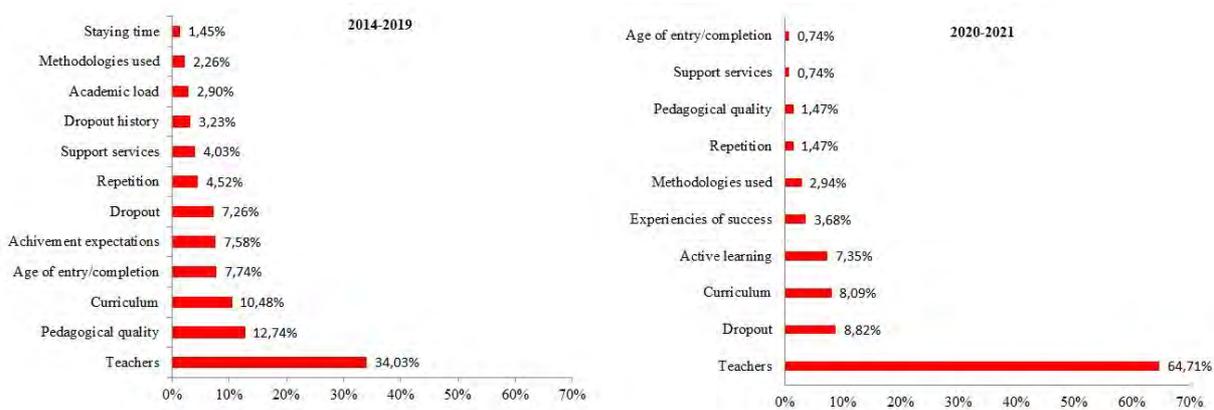


Figure 8. Evolution of the explanatory variables of the academic determinant
 Note. Prepared by the authors.

Socioeconomic determinant

The socioeconomic determinant for the period 2014-2019 ranks second in citations for school dropout. Figure 9 shows that "family income" is the most prominent variable in this determinant with 38.82% of the citations, followed by the variable "need to work" with 30.59%. This is followed by "residence location" with 14.12%, followed by the variable "Who are you living with?" with 12.94%. On the other hand, to a lesser extent, "parents' schooling", "culture" and "educability" associated with the students' development background are cited.

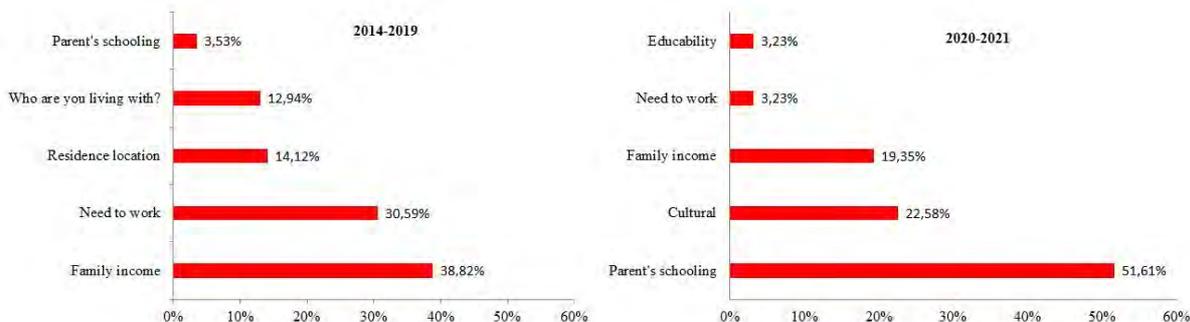


Figure 9. Explanatory variables of the socioeconomic determinant.
 Note. Prepared by the authors.

Sánchez et al. (2016) found a direct association between parents' expectations of education and "family income". A low level of "family income" is associated with low expectations and commitment to the children's studies, while parents with high income expect higher school performance. Studies corroborate the statement that economic situation is strongly related to school dropout (Cuesta, 2019; Prados & Alcaraz, 2018; Ramírez et al., 2018). The "need to work" is also associated with family economic shortcomings.

The third variable in citation is "residence location" as students in rural areas have a higher tendency to drop out than those residing in urban areas, highlighting the favourability of building EI close to concentrations of potential students to reduce transportation costs and access time (Ganimian & Murnane, 2014).

For the 2020-2021 period, the determinant is in fourth place in terms of citation. The most cited variables are "parent's schooling" (51.61%), "cultural" (22.58%), "family income" (19.35%) and need to work (3.23%) which can be seen in Figure 9.

"Parents' schooling" was directly linked to the permanence and effectiveness of students' educational achievements. Alban et al., (2020) pointed out the importance that the educational offer creates contents that instruct parents and caregivers on the use and appropriation of remote education tools for preschool and elementary school children and thus guarantee the continuity of their studies at a distance, it is proposed the creation of television, radio and internet programs that reach rural and urban areas that traditionally maintain their unfavorable conditions of poverty and inequality exacerbated today by the pandemic and attributed to the low educational level of this population and that tends to perpetuate this condition. Castro et al., (2020) pointed out in their studies how in Latin America there is a high number of school dropouts, which increases as the social stratum decreases.

The "cultural" variable emerges in this search, which refers to the generalized vision of the school as a place for acquiring knowledge imparted in a physical place and with the accompaniment of teachers. School is associated with social mobility and the improvement of the economic future for those who have access to it, only that worldwide COVID-19 pandemic has imposed conditions that make this a less safe and reliable environment but one of recognition of difference, linguistic, religious, social, ethnic and diverse pluralism that advances its organizational activity as Tapia and Peregalli (2020) noted, as an organization that learns and analyzes its context, that undertakes actions with the possibility of carrying them out and that is concerned with the inclusion of the entire school-age population, regardless of its multicultural nature and only concerned with the exercise of the right to education.

Individual determinant

Figure 10 shows the citation results for the variables of the individual determinant. For the period 2014-2019, this determinant was ranked third in citations. Here the variable "parental support" stands out (19.88% of the determinant's citation). Subsequently, "compatibility between studies and work" and "compatibility between studies and family life" (15.53%) had equal proportions. The least relevant variables in this case were "age" (0.62%), "health problems within the family" (0%) and "academic motivation" (0%).

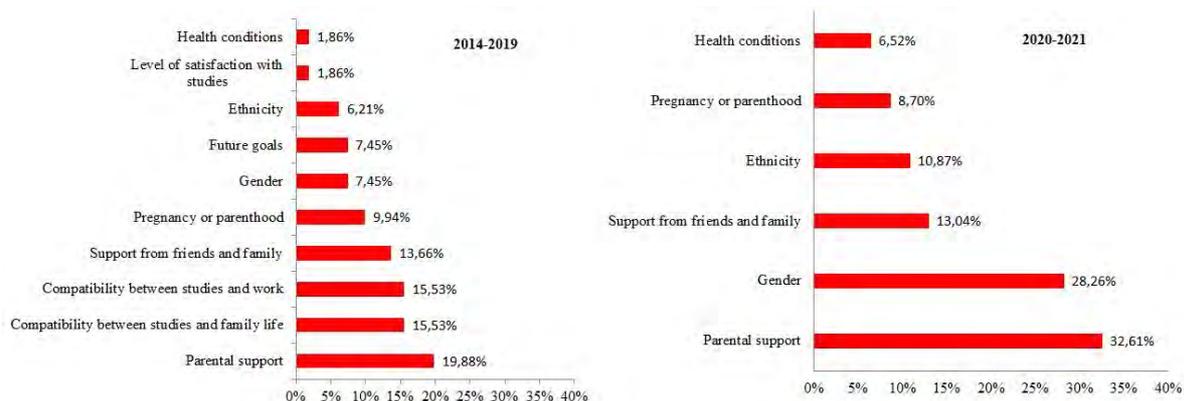


Figure 10. Explanatory variables of the individual determinant

Note. Prepared by the author.

"Parental support" was understood as the active presence, accompaniment, and demand for the fulfilment of schoolwork, creating commitment and improving academic results, which lead to persistence until the completion of studies. Mazuera and Alborno (2017) recorded that there is a direct relationship between the educational achievements attained by students whose parents have higher educational levels.

The "compatibility between studies and work" and "compatibility between studies and family life" are variables that affect student retention because dropout is precipitated in unfavourable economic conditions that lead to early labour insertions with low remuneration and high time demands that distance the child from the family environment (Munizaga et al., 2018).

For the period 2020-2021, the individual determinant ranks third in citation. The variable "parental support" takes the first place with 32.61% of the citation expected result in attention to the regulations that require the development of academic activities at home with the guidance and supervision of teachers and parents, given the preventive isolation. The data presented in the study conducted by (Alban et al., 2020) indicate that only 36% of the countries provided education in the virtual-presential modality for preschool children and 30% did not offer it, which further complicated the task of supporting parents and caregivers by not having a specialized guide on the subject and leaving all the responsibility at home. In contrast, Seusan and Maradiegue (2020) urged educational authorities on the need to guide parents and students to develop a safe and independent online work given that the activity is advanced and will certainly become part of the activity at the time of returning to the classroom.

In second place a variable "gender" (28.26%), framed as a mechanism of social exclusion as pointed out by Antoninis et al., (2020), is a normalized barrier in which the time that boys can spend in front of technological elements is greater than that available to girls, to whom caring work at home is imposed to the detriment of their study time (Azevedo et al., 2020).

Institutional determinant

Regarding this determinant, in the 2014-2019 period, it ranked fourth and it was found that the most cited variable was "political environment" (42.68%), followed by "quality of the institution" (20.33%) and then "institutional academic support" (15.85%). The least relevant variables were "transportation" (5.28%), "funding or scholarships" (2.03%) and "location of the EI" (0.41%) (Figure 11).

According to the articles in the sample, the "political environment" has two meanings: the first, as educational policies that improve investment and execution of education spending by advancing in infrastructure and in valuing the teaching profession; and the second one, regarding the social scenario of violence and conflict in which the regulation and domination practices of legal and illegal armed actors transformed the types of coexistence and the economic, political, ecological and socio-cultural relations from which school dropouts resulting from displacement or recruitment arise (González & Llaugel, 2016).

The "quality of the institution" is the second most cited explanatory variable and is mediated by the combination of human, technological, cultural, physical, and teaching performance factors that collectively promote lifelong education and learning (Escribano, 2018);

The "institutional academic support" focuses on the attention to students in academic and behavioural matters, to promote the best environment for the development of the learning activity, establishing study habits and persistence, as well as creating awareness of individual strengths and weaknesses (Ovalle, 2019).

For the 2020-2021 period, this determinant rises to second place and the most cited variable is " infrastructure " (31.58%), followed by " institutional academic support " (30.53%), and then by " political environment " (17.89%) (Figure 11).

Studies conducted by Arias-Velandia and Rincón-Báez (2021) pointed out how the conditions of access to electronic devices and connectivity in Colombia and other nations in the hemisphere show notable differences and problems especially in low-income households, rural or remote areas, as these are basic factors in the new way of providing educational service, which is now supported by technologies (Sevilla-Vallejo, 2021). In response to this crisis, educational authorities have sought collaborators and institutional alliances with universities and other organizations with the purpose of supporting online learning, strengthening it with training programs that allow getting to know the teaching-learning tools proposed in these programs and making the most of their potential to provide motivating educational environments accompanied by best practices in the educational service (Reimers & Marmolejo, 2021). Finally, and for the return to school in Colombia, educational establishments are adapting the infrastructure, schedules, classrooms, guaranteeing access to water, basic sanitation, ventilation of spaces, connectivity, and access to ICTs, together with financial resources to mitigate abandonment and encourage the return (Ballén et al., 2020).

In second place is the "institutional academic support" variable, which should be aimed at the inclusion of all students with disabilities and, more than welcoming them, recognize the obstacles which prevent their full, institutional and social inclusion, This crisis should allow the embracement process to take place on the basis of dialogue and open participation of the parties, it is the support approach for a school that faces, attends and remains active in the crisis and now must do it again for the return to the classroom; the support involves providing educational alternatives that combine formal classroom education with online education platforms, leaving no one behind (Caarls et al., 2021)

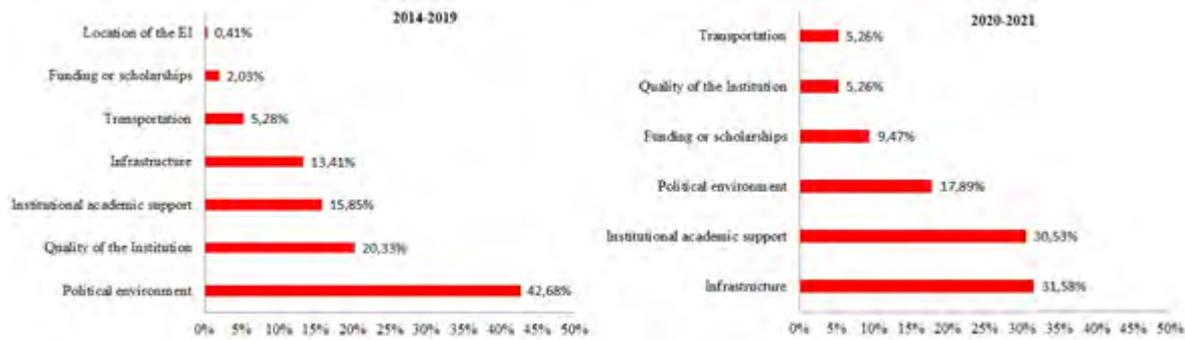


Figure 11. Explanatory variables of the institutional determinant
 Note. Prepared by the authors.

Discussion

When analysing the relevance of the explanatory variables in the different published studies, the characterization of student dropout as a system of dynamic complexity that is consequently multifactorial is ratified (Barragán, 2017). The variables affect each other, which results in difficulties to separate the border and define them, as shown by the variables "teachers", "curriculum", "pedagogical quality" and "methodologies used" whose meanings or characteristics overlap.

The complex nature of student dropout imposes on those who formulate and evaluate educational public policies, the orientation of programs and plans in an articulated manner to mitigate the simultaneous effect of the explanatory variables, as opposed to atomized or strategies for very specific variables. As an example, it can be mentioned that, although it is true that free education and cost savings, such as feeding programs, are significant, they may have better effects if they are accompanied by changes in the quality, quantity and delivery of educational services provided in schools (Bauchet et al., 2018; Edo et al., 2017).

It is important to take advantage of the opportunity offered by the development of the crises in terms of the possibility of generating training actions in the ICT Competency Framework for Teachers in order to achieve a complete integration between the face-to-face and virtual worlds that from now on must coexist in the conditional return condition to global health circumstances, a fact that makes it necessary to prepare institutions and their members in this hybrid modality of education.

Similarly, the methodology and the results obtained point to the need to implement techniques such as system dynamics to carry out modelling and simulation studies of this system that show its behaviour over time and the relationships between variables without reducing complexity and without subordinating the whole to the parts or the parts to the whole (Aracil & Gordillo, 1997).

The variables associated with the institutional determinant are closely related to "educational quality", mediated by the relevance of the offer to the EI context and the knowledge applicability in the students' environment. Thus, in the pandemic context, the institutional framework is definitive since it is autonomously in charge of guaranteeing the educational service in accordance with the biosecurity guidelines and protocols issued jointly by the Ministries of Education and Health and Social Protection, local authorities, and education secretariats within the framework of the pandemic. The provision and efficiency of educational services with national coverage (urban and rural) can reduce inequality based on the geographic location of students and teachers.

Permanence in the system with actions focused on improving quality and motivation for studies constitutes an opportunity for improvement, moving from a focus on service coverage to one that also privileges quality, in an attempt to create a culture of appreciation and excellence for the development of educational activity, which results in the strengthening of competencies and skills for the academic capital required in higher education, the labour market or entrepreneurship demanded in the 21st century.

It is also important to highlight that the institutional determinant requires strategies associated with the creation of early warning systems for students likely to drop out, school tutoring programs to mitigate school dropout due to academic performance, as well as incentives for the highest-level teachers to be interested in joining rural EI, to be continuously trained and to remain in these areas (Comisión Económica para América Latina y el Caribe [CEPAL], 2015).

Finally, the socioeconomic determinant points out that the regions with the highest poverty indicators are associated with higher dropout rates, particularly, dropout is more frequent in adolescents from lower income families, in addition to the fact that pregnancy is a significant reason for adolescents to exclude themselves from the educational system rather than school rejection (CEPAL, 2015; Delgado, 2014; González & Llaugel, 2016; Malagón, 2010). The "family income", "the need to work" and in general the economic conditions of families remain one of the recurring challenges for Colombia regardless of the pandemic conditions, and in post pandemic times when new challenges arrives given that educational institutions will not be able to provide full face-to-face attention to all students, they are even more obliged to face this

problem by offering hybrid solutions that develop teaching and learning formats, combined between face-to-face and virtuality, ratifying that at all levels the modality is here to stay and offer it as an alternative to address the emergency, still present, and as an alternative for the transformation of the new educational proposal that links presence and distance in a single modality.

Conclusion

The citation density during the systematic search in the publications of the databases consulted positioned the academic determinant as the most relevant. This was followed by institutional, then individual and finally socioeconomic determinants.

In the academic determinant, the most relevant explanatory variables were: "teachers", "pedagogical quality" and "curriculum". These variables focus on the student as the protagonist of the educational process and on the contents that strengthen the student in the system to the extent that they link meaningful learning experiences that develop competencies for life. Furthermore, they are expected to be inclusive, to stimulate institutional belonging and the personal development of life projects, since they are directly related to socioeconomic conditions and expectations of improvement, promoting in students and their families an interest in education as a factor of social mobility.

In the institutional determinant, the most prominent variables were "political environment", "quality of the institution" and "institutional academic support". The individual determinant variables with the most citations were "parental support", "compatibility between studies and work" and "compatibility between studies and family life". While, for the socioeconomic determinant, the variables in order of relevance were: "family income", "need to work" and "residence location".

The results obtained in the search for information to characterize the determining factors for dropout have common places in terms of the need to have an educational proposal that combines presence and virtuality with methodologies and curricula that allow the provision of the service, the monitoring and evaluation of the courses and the educational trajectory in general, having a physical infrastructure that meets the minimum conditions of basic sanitation to attend in presence, as well as having a technological infrastructure with connectivity that also allows to provide the required service by this means, with staff trained in the management of all these tools according to the role they play in the educational institution.

Through the process of coding and analysis of the texts from which the variables were extracted, two types of ideas could be summarized: the first relates to the definitions of the variables themselves, which comprise or group multiple aspects that make them overlap with each other. The second is related to the techniques or theories from which a system of dynamic complexity such as student dropout can be studied, since they must be sufficiently broad and strong to allow a vision of the whole and of the parts.

The pandemic and post pandemic have created conditions of isolation and confinement that force the educational system to accelerate or finally implement the necessary changes to provide public education with minimum technological resources (computers and connectivity) for both students and teachers, in order to address the situation of providing remote modality services, overcoming the enormous obstacle represented by the lack of internet access (1 in 3 in urban areas or 1 in 30 in rural areas). This fact makes difficult to advance and continue with education for a large population of the territory, thus it is necessary to accelerate the efforts in connectivity and in turn develop strategies for remote service delivery via digital technology, with flexible educational models that invite and motivate to continue with remote education, by not replicating the undesirable practices of face-to-face teaching in this environment developed to mitigate the effects of the pandemic and to continue in the post pandemic period in order to innovate and improve the provision of official basic education services in Colombia in terms of quality and quantity.

Recommendations

Dropout variables must be monitored from many different perspectives. Likewise, there is a need to update related studies to track dropout factors, including new variables as internet connectivity for low-income households in urban and rural areas as well as blended education, in-person, and distance education as educational supply in the pandemic situation.

Studies could be focus on how ICT teacher training programs have been developed, in terms of its coverages, level achieved and impact that they have had on student retention. In order to address these issues in basic education, it is necessary to use advanced techniques like in higher education where system dynamics modelling and statistical tools such as SPSS or more and sophisticated techniques such as data mining are used extensively in order to have a better understanding and approach to the problem of school dropout.

Limitations

A possible limitation of the study was a lack of weighting of the effect of the identified variables and the modelling of their incidence on dropout rates, which can contribute to optimizing resources to promote student permanence. This limitation simultaneously is a new research opportunity.

During the search for new information, we were faced with changes in the policies of access to the databases, specifically to Educator's reference, now part of the GALE platform which was unable to access either personally or institutionally preventing us from consulting the documents that could be there; secondly, the Web of Science platform changed its form of consultation and for its access is necessary to register on the Publons.com platform for authors from where the Web of Science documents can be accessed.

An important limitation in comparing systematic reviews for the 2014-2019 and 2020-2021 periods can be the delays in publications. In other words, manuscripts are submitted, but they are not published instantaneously. Perfectly, submission and publication for an article can be distanced until a year or more. Then, the study may have been published in 2021, but the study data belongs to 2018. It is important to remember that the study is circumscribed to articles published during the periods 2014-2019 and 2020-2021. Moreover, the PRISMA flowchart refined the sample to 157 articles whose full text is open access as shown in Figure 5

Authorship Contribution Statement

Barragán: Conceptualization, design, analysis, writing, editing/reviewing, supervision, final revision and approval for submission. Lozano: Conceptualization, design, analysis, writing, editing/reviewing, final revision and approval for submission.

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