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Findings on education in Bogota (Colombia) based on a 2014 multipurpose survey

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Abstract

This paper presents a study on education of the 2014 Multipurpose Survey, financed by the District Secretariat of Planning of Bogotá city, which was developed by the National Statistics Department. This study focuses on determining the main reasons why people of school age did not do so (attend school) at the time of the survey, and in characterizing the educational levels of household heads and their spouses or partners as referring adults in the surveyed households. The survey was applied to a sample of 61,725 people, who according to the sample design represent 7,794,463 inhabitants of urban areas in Bogota. Using descriptive and data mining techniques, it is stated that the two main reasons for not attending school are the lack of money and the need to work. In addition, marital status is a more determinant predictor than sex or socioeconomic stratum. Single people are motivated to earn a college degree when they have had access to higher education at some point in their life. When attending school the information of household heads, a similar behavior was observed, because the reasons for not attending school were practically the same. Unplanned pregnancy and living with a partner are not outstanding reasons.

Key words: Sampling survey, educational statistics, school dropout, educational prospecting and classification system.

Introduction

Education researchers cannot always count on information from statistical samples that represent large populations. Commissioned by the District Planning Department of Bogotá (SDP), and designed and applied by the National Department of Statistics, the last 2014 Multipurpose Survey (EM-2014) uses a probabilistic sample to investigate, among other aspects, the conditions of education of citizens. Although the results of the survey are freely accessible and statistically represent the inhabitants of Bogotá and its surroundings, there are no research references in the literature that have used this information to know the reality of education in Bogotá. This document analyzes several of the questions included in the Education chapter of the 2014 Multipurpose Survey and, in particular, the main reason given by the citizens of Bogotá for not attending school. Knowing the main reasons for not doing it is important because they can serve as a baseline to investigate school desertion or student drop out. This is also the reason for this study to analyze the relationship between variables such as age, marital status, educational level of parents, etc., in the decision to attend school or not of the respondents.

The study takes as reference the EM-2014, as well as the theory on school drop-out and public education policies, because they have given clues to establish the determining factors in school dropout. With respect to the first reference, the technical

aspects of both the application and the processing of the data are detailed, making reference to the descriptive statistical questions and the mining of data through decision trees. With respect to the second, the results obtained and the discussion of them are shown in the light of studies by different authors.

The approach to EM-2014 has an interdisciplinary nature since addressing the reasons why people at school age do not do so represents a complex problem that requires a mixture of resources from public policies, statistical modeling and theories of dropping out of school. It should be noted that the scope of this writing includes reviewing, updating and analyzing the reasons why Bogota citizens stop attending school, based on the information of EM-2014. It should be emphasized that a broad theoretical framework for dropping out of school is outside it [1].

Background: The District Secretariat of Planning and the Multipurpose Survey

In Colombia, the Decree 1421 of 1993, “by which a special regime for the Capital District of Santafé de Bogotá is issued,” announces the administrative structure of the Capital District, placing the SDP in the central sector (Colombia, Presidency of the Republic, 1993). In addition, the Decree 16 of 1993, “by which the internal structure of the District Planning Department is adopted and other provisions are issued,” assigns the SDP the objective of guiding and leading the formulation

and monitoring of policies and territorial, economic, social and environmental planning of the Capital District, together with the other sectors (Mayor's Office of Bogotá DC, 1993).

Thus, within the scope of its basic functions [2], the SDP in conjunction with the National Department of Statistics (Dane, or its initials in Spanish) developed the EM-2014, which allows gathering information to advance statistical studies that enable public policy decision making (District Secretariat of Planning, 2015). The SDP was the financier; and the Dane was the field operator for the applications of 2011 and 2014.

With the 2011 survey, the SDP compiled 13 city indexes, monographs for each of the localities of Bogotá and published City Bulletins; however, there was none focused on education. The SDP in *Main Results in Bogota and the Region* analyzed the results of the 2014 application regarding illiteracy, school attendance and briefly the educational level of household heads (District Planning Department, 2015), in a comparison with the previous application.

The information on which this work is based corresponds to the application of the EM-2014, focusing on the 31 questions associated with the topic H, entitled Education, for the answers obtained in Bogota, consulting people aged 5 years or older. Other municipalities were not considered. It must be added that this work is based on the fact that the SDP provides the information of the survey and the complete database to all public entities and the academic community in general to be used for research purposes (District Planning Secretariat, 2015).

Theoretical and public policy perspective

The importance of analyzing aspects related to education with this large database recently set up by a Colombian official entity can be limited to two complementary frameworks. The first is related to the National Development Plan 2014-2018, *Everybody for a new country*. In this, it has been emphasized the importance of education for equity and peace as a citizenship's aspiration (National Planning Department, 2015), this is supported in (the fact) that an educated society has a qualified

workforce, which receives the returns to education through opportunities to generate income and quality jobs, and has citizens who resolve their conflicts without resorting to violence (National Planning Department, 2015, page 23). Moreover, in Volume I of this same plan, it was stated that "education is the most powerful instrument for closing social gaps; these dynamics ensure great progress for the country in terms of social and labor mobility, benefiting mainly Colombians of lower income" (National Planning Department, 2015, page 77)

The second is desertion or drop out in school institutions. The Ministry of National Education of Colombia (MEN, for its initial in Spanish) has defined school dropout as:

It can be understood as the abandonment of the school system by students, caused by the combination of factors that are generated both within the system and in social, family, individual and environmental contexts (Ministry of National Education, 2011).

In addition, reference can be made to the definition of dropping out of higher education in the *Alfa-Guia* Project [3], this being:

The cessation of the relationship between the student and the training program leading to obtaining a degree in Higher Education, before graduating. An event of complex, multidimensional and systemic nature, which can be understood as cause or effect, failure or reorientation of a training process, choice or mandatory response, or as an indicator of the quality of the educational system (Alpha Project Guide DCI-ALA / 2010 / 94, 2013b: 6).

It is in this atmosphere that the interest to attend school EM-2014 emerges, emphasizing two aspects related to education and the reasons for not attending school. The first analyzed aspect concerns the reasons given by people in Bogotá for having stopped attending school. The second aspect is related to the educational level of the head of household and her spouse or partner. The SDP defines the head of household as:

The head of household is that person who is recognized as such by the rest of the household,

under the criteria of the persons of the household (the criterion to define who is the head of the household is often determined by aspects such as the older person, their economic contribution to the household, their leadership to make decisions, among others) (District Secretariat of Planning, 2015: 64).

The EM2014 directly asked for the educational levels of the parents; however, since there were questions to corroborate the coexistence or not with the parents, and the formulation of those questions, it was decided to do the processing of the answers in relation to the head of household and her husband or partner [4].

The MEN classifies the explanatory variables of students' drop out in four determinants: socioeconomic, individual, institutional and academic (Ministry of National Education, 2009, page 27) including the educational level of the parents in the socioeconomic determinant (Ministry of National Education, 2009). Apparently, a family academic background linked to formal education has a protective effect in terms of dropping out of school. Similarly, the psychological model of Ethington proved empirically that the family background and the student's previous academic performance have a direct influence on two senses: the first relates with the family stimulus and support, which affects future aspirations; and the second is directed towards academic self-concept and the perception of the difficulty of studies. All this has repercussions on the values and expectations of success that the student has, leading to permanence in post-secondary education (Ethington, 1990: 283).

In summary, with the database of the EM2014, it was deepened in relation to dropping out the school system in two aspects: 1) Reasons why people have stopped attending school; 2) Educational level of the head of household and her husband or partner. Although having stopped attending school while being at age for it is not exactly the same as desertion or dropping out of school, they are closely related. The reasons that Bogota citizens expressed can be constituted as explanatory variables within the MEN's determinants of school drop-out, and they can shed light on what should be

investigated and reinforced in the plans to mitigate this phenomenon.

Materials and methods

The EM-2014 is divided into 13 subjects; the H corresponds to education, with 31 questions [5] that were applied to people aged 5 years or older. The survey covers educational levels, use of spare time, family spending on school supplies, access to subsidies and care for minors. As an example, the question number 3: What is the main reason why you do not attend school? It was formulated to those respondents aged 5 years or older. To answer, they had the following response options: 1) He/she considers that they are not of school age; 2) He/she considers that are done; 3) High educational costs; 4) Lack of money; 5) He/she must be responsible for domestic chores and/or care of children and other household members; 6) Need to work or look for a job; 7) He/she does not like or is not interested in keep attending school; 8) He/she married or formed a couple; 9) Lack of school quotas; 10) There is no nearby educational center or the assigned establishment is very far away; 11) Need of special education; 12) Pregnancy; and 13) Medical conditions. Likewise, the question includes an option for another reason that can be elaborated by the respondent (District Secretariat of Planning, 2014, page 37).

The database [6] used in this study corresponds to that obtained by the SDP in the application of the EM-2014 using only those that correspond to urban areas of Bogotá. The population, the instrument, the sampling frame and sample selection are those defined by the SDP. According to the technical data sheet, the results of EM-2014 have a relative standard error equal to 5% and a reliability level of 95% for prevalence values of around 10% (District Secretariat of Planning, 2015).

Although the geographical location of the survey is more extensive, this work is framed in the data collected for Bogotá, considered in the 20 localities [7] in which it is administratively divided: Usaquén, Chapinero, Santa Fe, San Cristóbal, Usme, Tunjuelito, Bosa, Kennedy, Fontibón, Engativá, Suba, Barrios Unidos, Teusaquillo, Los Mártires, Antonio Nariño, Puente Aranda, La Candelaria,

Rafael Uribe Uribe, Ciudad Bolívar and Sumapaz.

Both in the general and specific exploration of the work hypothesis, the following steps were carried out:

1. Explore the survey and its topics.
2. Study education descriptively.
3. Relate the education variables with others of the survey.
4. Interpret the results found.
5. Expand the interpretation with secondary sources.

To carry out step 3, an analysis by means of decision trees was included. A new variable was defined based on two questions in the EM-2014, unifying in a variable those who were attending school and those who were not, since the EM-2014 is adapted (separating questions) to each case. Table 1 contains the questions that were asked, and the new variable that was named as: *He/she has studies of...*

Table 1. Frequencies in education levels for people older than 5 years who did not attend school

	Question for those who were not at school		Question for those who were at school		New variable
	What is the highest education level achieved?		In what (education) level is he/she enrolled?		He/she has studies of...
1	None			1	
2	Kindergarten	1	Kindergarten	2	Kindergarten
3	Primary school	2	Primary school	3	Primary school
4	Secondary school	3	Secondary school	4	Secondary school
5	Technical school	4	Technical school	5	Technical school
6	Technological school	5	Technological school	6	Technological school
7	University (incomplete)	6	University	7	University (incomplete)
8	University (full)			8	University (full)
9	Specialization (incomplete)	7	Specialization	9	Specialization (incomplete)
10	Specialization (full)			10	Specialization (full)
11	Master's Degree (incomplete)	8	Master's Degree	11	Master's Degree (incomplete)
12	Master's Degree (full)			12	Master's Degree (full)
13	Doctorate (incomplete)	9	Doctorate	13	Doctorate (incomplete)
14	Doctorate (full)			14	Doctorate (full)

Source: self-made.

The choice of statistical modeling through decision trees, as a technique of data mining, was made considering that in these models the important attributes for the classification of the respondent are explored with respect to the variable of interest; and the attributes that do not have scope are left aside because they do not contribute to tree precision (Barragán, Calderón, González, Rodríguez, & Ruiz, 2015, page 35). The decision tree was used to analyze a possible link between the decision to attend school or not, and variables

such as age, sex, marital status, socioeconomic stratum, type of link to the health system and type of housing tenure.

Taking into account that Tan, Steinbach & Kumar affirm that trees classify observations framed in decision rules (Tan, Steinbach, & Kumar, 2006), it was considered as a variable of interest if the surveyed Bogota citizen attended school at the time of the survey (it corresponded to the question: *are you currently attending school?*); and the explanatory variables of the model were: age, sex, marital status, socioeconomic stratum, type of linkage to the health system, and type of housing tenure. The decision trees (that were) built grouped marital status into two categories: single and no single, in which *no single* is a person living as a couple, widowed, separated, divorced or married. This division guaranteed a better explanation of the decision of citizens to attend school or not doing it.

The variables that had no influence on the decision to attend school were ignored by the classification model. The latter is very important because the variables that really mattered in terms of the classification of an individual with respect to their decision to remain in the formal education system were condensed in the decision tree.

There are several algorithms for constructing decision trees; here, it was used a C&R type with the Gini index as a measure of impurity; this way, each nonterminal node is broken down into binary categories.

Regarding the processing of the database, it was made with the statistical software SPSS, version 23. The tabulation of the information for its presentation was made with Excel (Microsoft Office suite).

Results

This section presents the results of the processing of the database provided by the SDP in the application of the EM-2014, which allowed to understand generalities of the population of Bogota, as well as the main reasons why the people who were in age of attending school did not do it. The reasons especially had to do with socioeconomic determinants of desertion and

dropping out; similarly occurred for household heads and their spouses. In addition, it was found that civil status is a predictor to decide whether a person was attending school or not.

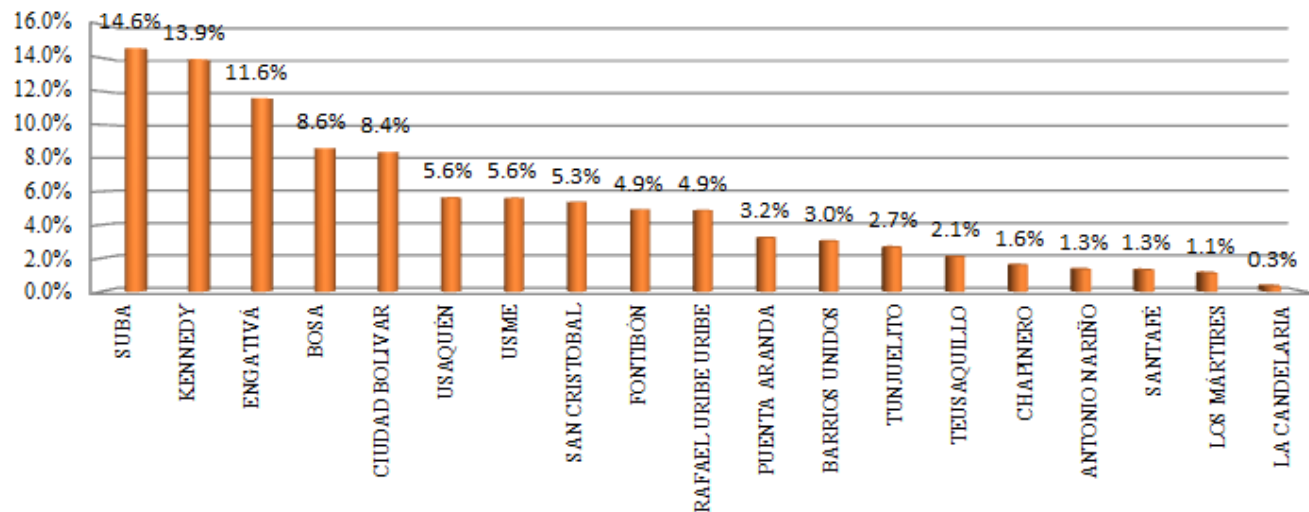
In this order of ideas, the section devoted to the results was divided into three sections: 1) Generalities of the EM-2014 and its relationship with education; 2) the reasons why some Bogota citizens had stopped attending school; and 3) information provided by the head of household and her husband or partner regarding education.

Generalities of the Multipurpose Survey and education

The sample of 61,725 people represented a universe of 7,794,463 Bogota citizens from urban areas. 48.3% of the inhabitants of Bogotá were men, 51.67% women and 0.03% intersex (this information was consulted to people aged over 15 years). We identified 571,571 children from 0 to 4 years old. It is necessary to reiterate that the item *education* was applied to people of 5 years or more, with which the population of the base studied in this document was 7,222,892.

The question about whether he/she knows how to read and write, was processed considering the responses of people who were aged 7 years or older (6,976,456 people), taking into account that this is the age at which it is expected to be acquired the initial reading ability, at curricular level. It was found that, in Bogotá, 98,566 people over 7 years of age are illiterate (98.6% answered that they do not know how to read). In Suba there are 11,046 people who cannot read and write, which is equivalent to 1.1% of the population of this town. On the other hand, the largest illiteracy by location is that of Santa Fe, 3.2%.

30.5% of those who answered the item *education* (2,200,853 people) said they were attending school at the time of the survey, in contrast to the 69.5% who said no (5,022,039 people). With which it is estimated that in Bogotá, in 2014, 3 out of 10 inhabitants aged 5 years or older were attending school.

Figure 1. Proportion of student population by location.

Source: Self-made

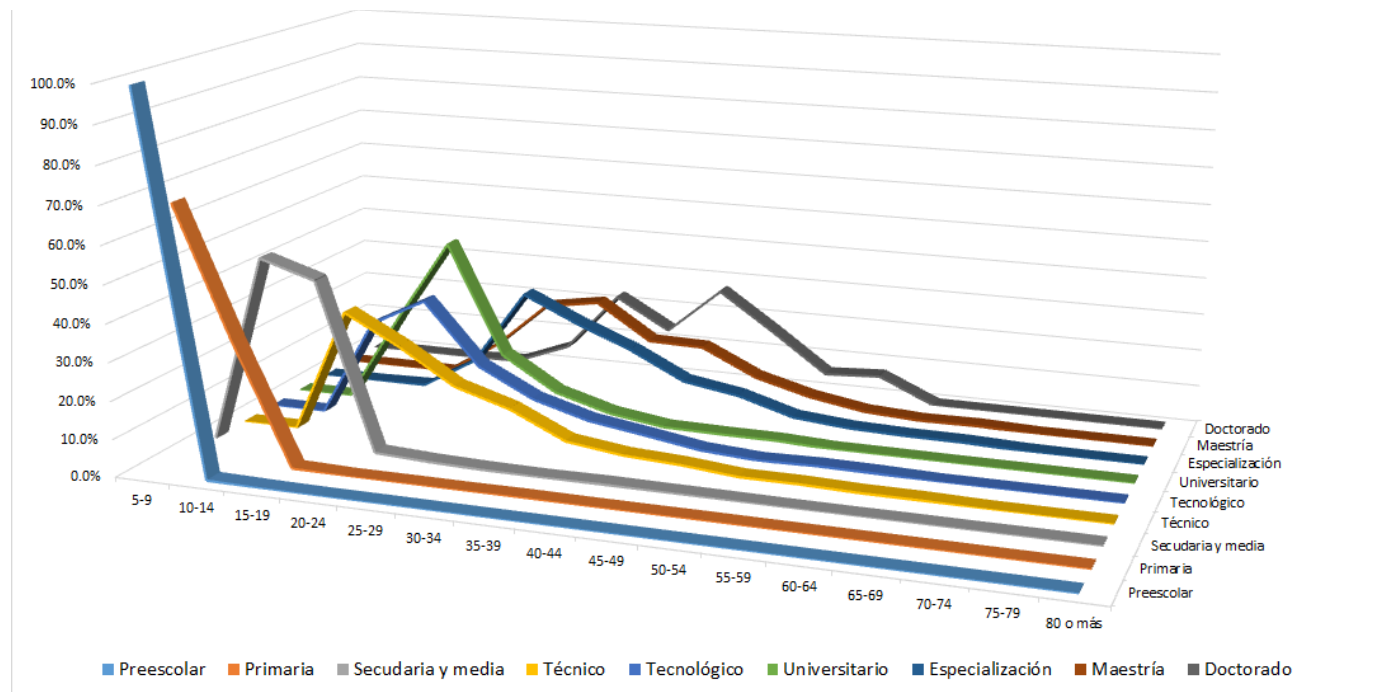
Of the student population aged 5 years or older, 161,586 children in Bogotá were in preschool, of which Suba had the highest percentage with 15.6%, followed by Kennedy with 14.3%. 1,524,771 were in Preschool, Primary, Secondary and Middle Secondary School (69.3%). 27.4% were at undergraduate level (technical, technological and university); and 3.3% at graduate level (specialization, master and doctorate). It is noted that in the socioeconomic stratum 6, no person was at a technical level. It is striking that 0.3% (6,070 people) were attending a doctorate; of these people, 45.3% were concentrated in Suba and 10.2% in Barrios Unidos. In Kennedy, Bosa, Antonio Nariño, Ciudad Bolívar and Engativá, the sample did not show anyone attending a doctorate [8].

In addition, the average age of children enrolled in preschool is 5.5 years (in La Candelaria, it was recorded 8.7 years on average) and that of those enrolled in primary school is 8.8 years (the average in Bosa was 9.7 years; and in La Candelaria, 9.6 years). In secondary school, the average age was 14.9 years; however, there is 1.4% (10,305) of secondary and middle secondary school students aged between 20 and 24 years. The choice of technical and technological education occurs at ages subsequent to the choice of the university since the average age of university students is 23.6 years, while the average age of people enrolled in technical and technological education is 25.3 and 25 years respectively. Students enrolled in specializations have an average age of 33.7 years, with a peak between 25 and 34 years. Students enrolled in master's degree programs have an average age of 34.7 years; and that of those enrolled in doctorates is 40.4 years.

In socio-economic strata 1 to 3, the age for undergraduate studies ranged between 23.5 and 24 years; and in strata 4 to 6, between 22.5 and 23.1 years. The distribution by age group of the people who responded to the EM-2014 in Bogotá who were attending school is summarized in Figure 2.

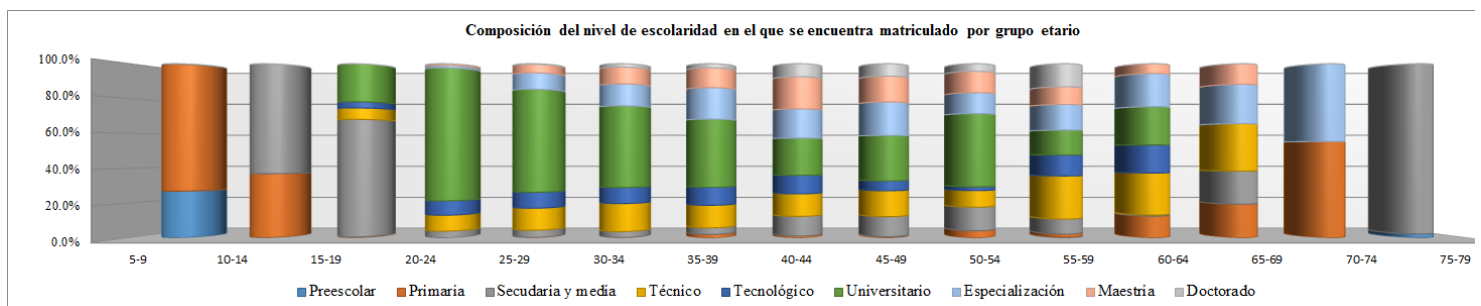
Figure 3 shows the distribution by age group of people who were aged 5 years or older, and who indicated the formal level at which they were enrolled (the question did not consider informal education options such as self-learning, home education or short courses). Here, it can be mentioned that the percentages for people older than 80 years were not included in this graph because it is almost 0. Strong attendance at primary education was observed between 5 and 14 years; and then between 50 and 74 years. The university level is between 15 and 64 years. The database reported that the vast majority of people aged between 75 and 79 years who were attending school, were doing it in secondary and middle secondary education [9].

Figure 2. Distribution of educational levels by age group for people who were attending school.



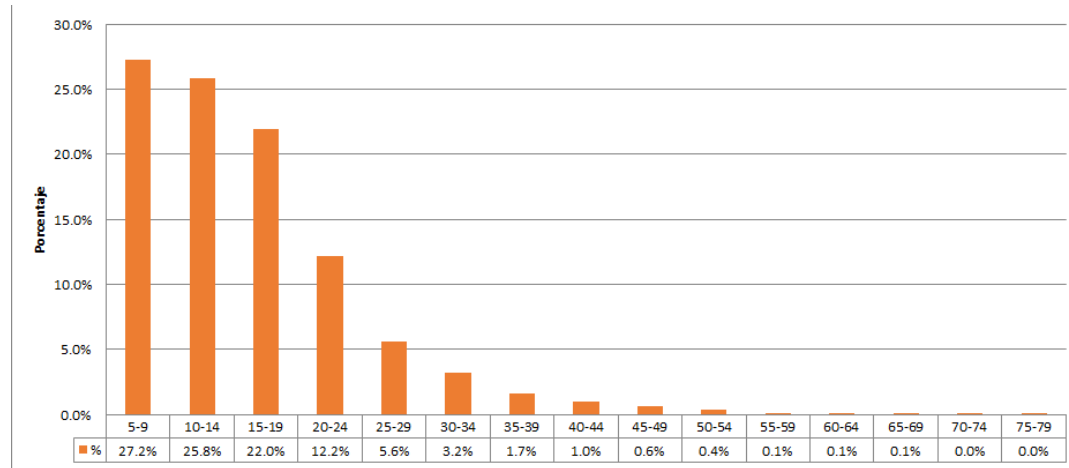
Source: self-made

Figure 3. Composition of the level of schooling in which the enrollment was with respect to the age group.



Source: self-made.

98.7% of the Bogota citizens aged 5 or older, who were attending school, were aged up to 44 years. From which it can be inferred that (an age of) 45 years seems to be a breaking point in the academic formation of the Bogota citizens, since from then on, only 1.3% continue linked to a formal education institution (see figure 4).

Figure 4. Percentage of people aged 5 years or more who were attending school in each age group.

Source: self-made.

The 1,524,771 people who attended the preschool, elementary school, or secondary and middle secondary school were asked if they were beneficiaries of subsidized tuition fees for schools or colleges in agreement, and if the household paid a pension fee in the educational establishment. 16.8% answered that they were beneficiaries and 31.6% affirmed to pay a pension fee in the educative establishment. 98.3% of those who claimed to be beneficiaries of scholarships and 79.28% of those who pay a pension fee were concentrated in strata 1, 2 and 3. In the case of Teusaquillo, only 3.5% of the people who are in these educational levels were beneficiaries of scholarships; while in Bosa, it was 23.5%. In Suba, there is the largest number of people in these initial levels, but they do not have the highest percentage of beneficiaries.

With the interest of analyzing information regarding who looks after children in the hours that they are not attending school, it was found that for 2.6% of children between 5 and 10 years, nobody takes care of them. 82.5% are cared for by a person from the same household and 14.1% by a woman from another household. Only 0.8% is cared for by a man from another home. Specifically, 11,554 children aged 5-9 years and 71,902 aged 10-14 years were left home alone when they were not in school. This may suggest some need for attention in complementary school days.

Here it is also contemplated the perception of a discriminatory treatment for a particular group of the population. It was found that the first reason for segregation is because of sexual orientation (being LGBT) (12.2%), followed by size, weight or physical appearance (10.3%), then by race or ethnic origin (9.6%), religious beliefs (8.6%), for being male or female (6.9%), and finally, for identifying with a group such as emos, skinheads, etc. (5.5%).

Aspect 1: Reasons why Bogotá citizens participating in EM-2014 had stopped attending school

Educational levels:

It is important to emphasize that of the 7,794,463 of Bogota citizens represented by the sample, 7.3% corresponded to children aged between 0 and 4 years; 28.2% were people older than 5 years who were attending school; and 64.4% were not doing it. It follows from the information that a hypothesis of application of the survey (this is not reported in the SDP documents) was that the reasonable age to attend school ranges between 5 and 34 years. Thus, 1,761,262 people were between these ages, of which 69.5% did not attend school, even though they were in the age range for it.

Table 2 shows the absolute and relative frequencies in each of the highest educational levels reached by those who were aged over 5 years but were not

attending school. Here it is highlighted that 42.9% of these people reached full secondary education, 18.9% primary education and 13.6% completed university education. Only 0.17% of people aged over 5 years who were not attending school completed a doctoral training. 2.3% did not have any type of schooling.

Table 2. Frequencies in educational levels for people aged over 5 years who did not attend school.

Highest school level achieved	Number of people	Percentage of total non-students
None	116,340	2.30%
Kindergarten	12,449	0.20%
Primary school	946,738	18.90%
Secondary school	2,155,621	42.90%
Technical school	474,588	9.50%
Technological school	182,231	3.60%
University (incomplete)	164,273	3.30%
University (full)	681,941	13.60%
Specialization (incomplete)	10,117	0.20%
Specialization (full)	201,235	4.00%
Master's Degree (incomplete)	5,086	0.10%
Master's Degree (full)	62,026	1.20%
Doctorate (incomplete)	759	0.00%
Doctorate (full)	8,636	0.20%
Total	5,022,039	100%

Source: self-made.

Age groups:

People aged between 5 and 34 years who did not attend school argued that the main reasons for not doing it were lack of money (30.1%), they needed to work (23.5%), and because they considered that they had finished school education (14, 5%). In contrast, the less frequent reasons were the need for special education (0.6%) and the distance to schools (0.2%). The details of the reasons are found in table 4 by age group. Something similar happens at locality level; in Bosa and San Cristóbal, the first two reasons are maintained, only the third reason changes due to the high educational costs and because they must take care of domestic tasks, respectively.

Exploring the reasons for not attending school between 5 and 14 years, there is a reason that is not identified by the survey. This means that their response was the option: *other*; this happened for 32.9% of children aged 5-9 years, and for 34.8% of children aged 10-14. This is equivalent to saying that in these two age group, there are one or more compelling reasons to not attend school that have not been identified. It is surprising that the reason given by 8123 children aged 5-9 years is that they consider that they are not at school age. For this age group, 11.4% said that the lack of quotas is the reason for not attending school (see table 4).

21% of children aged 10-14 years (3,059) said they are not at school because they do not like to do it; 13% (1,894) for lack of space; 11,6% (1,690) for lack of money; and 9,6% (1,396) that (they) need special education.

As Table 4 shows, in the group of 15-19 years, the main reasons for not attending school were: lack of money 28.8% (43.345); the need to work 16.4% (24.668); and those who do not like to attend school, 11.1% (16,692). The age group of 20-34 years shows that the reasons to stop attending school were: they consider that it is over; lack of money and need to work.

Only the group of 15-19 years mostly referred to pregnancy as a reason for not attending school. In general, pregnancy is not a significant reason for not attending school; however, this may be due to the design of the question, which can hide it under other reasons, such as the need of work or the lack of money.

In table 3, the three main frequencies of the reasons for not attending school in each age group have been put in bold.

By locations in the age groups, the primary causes for not attending school were, in order: lack of money, need to work, and consider that they were done with it. In Bosa and San Cristóbal, it only changes the third reason: for educational costs in the former: and because they must take care of domestic chores for the latter.

Of the people aged between 5 and 34 years who were not attending school and who considered

Table 3. Reasons why people aged between 5 and 34 years did not study; by age group, in percentage by row.

	Reason not to study														
	Consider that he is not in age of studying	They consider that it's over	Education costs	Lack of money	They must take care of...	They need to work	They don't like to attend school	Got married or engaged in a couple relationship	Lack of school quotas	There's no school nearby	They need special education	Pregnancy	Medical conditions	Other	
43348	34,2	0,0	0,4	6,0	1,1	0,0	1,6	0,0	11,4	4,1	3,8	0,0	4,6	32,9	
41913	0,5	1,1	1,5	11,6	1,7	0,9	21,0	0,0	13,0	1,1	9,6	1,2	1,9	34,8	
15-19	0,8	6,8	7,5	28,8	5,5	16,4	11,1	3,5	3,7	0,0	1,2	2,7	1,3	10,7	
20-24	1,1	11,5	7,1	35,1	6,5	24,9	3,5	2,8	0,7	0,1	0,8	1,6	0,5	3,9	
25-29	2,4	15,7	6,7	30,6	6,3	26,3	2,3	4,0	0,4	0,2	0,4	1,0	0,4	3,3	
30-34	3,9	18,3	6,9	27,8	6,2	23,4	2,8	4,3	0,3	0,1	0,2	0,5	0,7	4,6	

Source: self-made.

that they were not at school age, 17.1% said they did not have any level of schooling, and 43.0% secondary education. Of the people who needed special education, 46.1% did not have any formal educational level. Of the 19,300 people who said they had not continued their studies, the largest percentage was found in Fontibón.

Now, the highest educational level reached by people who were not attending school was mostly in secondary school, with 42.9%; followed by primary school with 18.9%. Only 0.2% said that they had a full doctorate. However, among the people who were not attending school and who considered that they were done with it, 21.3% reached secondary level and 43.5% university education. On the other hand, of the people who were not attending school and who were aged 5 years or older and had secondary education, 6% considered that they have finished their studies and 36% indicated that they did not attend school because they lacked money.

Results obtained with the decision tree

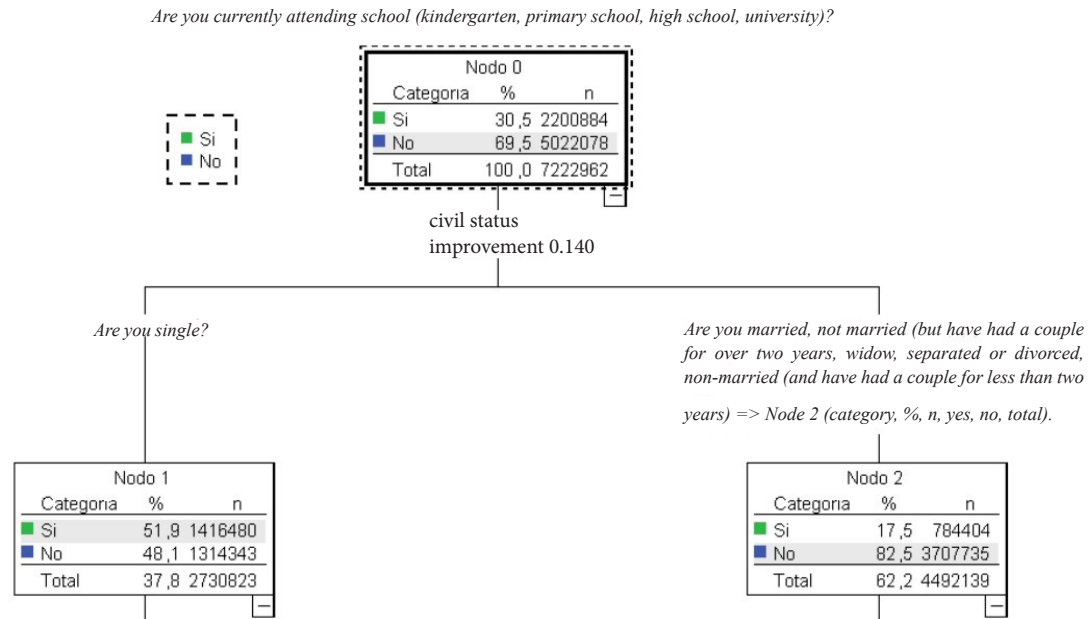
With regard to modeling using decision trees, it can be mentioned that when the age of citizens was included to explain the decision to attend school or not, the decision tree generated a break point at 19.5 years; that is, the proportion of individuals

who attend school is significantly different before and after age 19.5 years. However, age was not included in the subsequent decision trees, since with a higher number of students at the primary, secondary and middle secondary levels, it is natural that their ages are below 19.5 years. It is emphasized that, although the modeling included the aforementioned explanatory variables, the marital status was recurrent as an influential predictor, even more determinant than the socioeconomic stratum, sex, type of attachment to the health system or type of housing tenure.

Regarding marital status, it was found that among single Bogota citizens (2,730,823 people), 51.9% were attending school (1,416,480 people), while of non-singles, only 17.5% (784,404) were doing it. To illustrate the above, figure 5 shows nodes 0, 1 and 2 for the tree built for the question: *Are you currently attending school?*

As a result of what is observed in figure 5, it was considered important to characterize non-singles in terms of whether they were attending school or not, since the majority of the population who did it was in primary or secondary school; and it was reasonable (to assume) that their marital status was single.

Figure 5. Figure 5. Nodes 0, 1 and 2 for the decision tree by marital status for the question: *Are you currently attending school?*

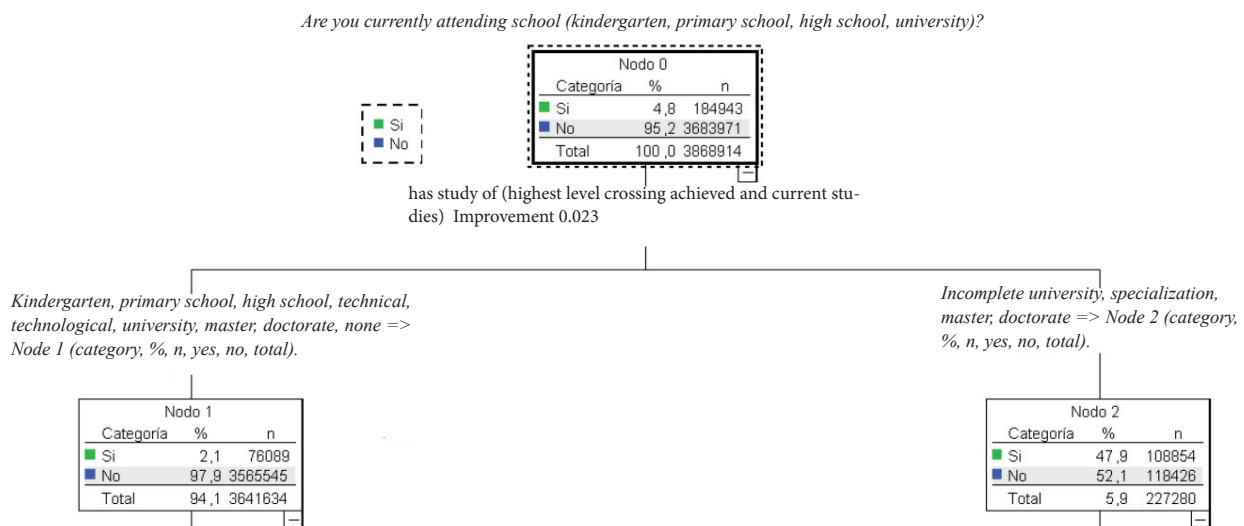


source: self-made.

Characterization of non-singles

4.8% (189,943) of the non-single people were attending school. According to the tree in figure 6, a motivation for non-single people to attend school was to obtain a degree at a higher level of education: undergraduate or graduate. There were 227,280 people who could at some point in their lives access to this higher education level; and of them, 47.9% (108,854) were attending school. Only 2.1% (76,089) of the non-single people with basic levels in education, or with a complete higher education were attending school in 2014. This percentage referred to the people who were attending school increases to 76.3%, if there are excluded those who were enrolled in undergraduate level.

Figure 6. Nodes 0, 1 and 2 for the decision tree for the question: *Are you currently attending school?* For the variable: *Having studied (something)...*



Aspect 2: Educational level of the head of household and their husband or partner

Examining now the educational level of the adults in a home, it was found that by asking each household member of the sample if the mother lived in that home, 42.22% answered yes; 38.9 % answered no; and 18.9% answered that she had died. The survey had foreseen that only for those who answered “no,” or that “she had died,” they would be asked the question about the highest educational level reached by the mother. In view of this circumstance, it was decided to investigate the educational level of the head of household and (the one of) her husband or partner.

According to the relationship with the head of household, there were located 2,437,996 household heads and 1,424,091 husbands or partners. When inquiring if they studied in formal education the same percentages were presented for household heads and for husbands or partners: 5.1% answered “yes” and 94.9% said “no.”

Household heads and husbands or partners who attended school at the time of EM-2014

Of the 125,415 household heads who did attend school at the time of the survey, it was found that 44.8% were enrolled at university level, 13.9% at technical level, and 13.1% at specialization level. It was observed that master and doctorate levels together register 12%, which is equivalent to 15,072 household heads in advanced studies [10]. Almost 80% of the youngest household heads (aged between 15 and 17 years) were attending school at university level. On the other hand, around 67% of household heads who attended school and whose age ranges between 35 and 44 years are enrolled in higher education programs, particularly 39.7% in graduate programs.

Among the 72,681 spouses (partners) or partners of the head of the household who attended school, 40% of them attended university and less than one fifth were (doing it) in graduate programs. In addition, it was found that 86% of those aged between 14 and 17 years were attending school secondary. 67.5% of those aged between 35 and 44 were attending higher education (15.7% in master and doctorate programs).

Household heads and husbands or partners who did not attend school at the time of the EM-2014

According to the hypothesis of the survey design, only people aged between 5 and 34 years were asked why they did not attend school. Under this assumption, ages in the selection of cases were analyzed with a minimum age of 15 years and an average of 47 years for the household heads. For the husband or partner, the minimum age was 14 years and the average was 43 years. It should be noted that there were registered households composed of up to 18 members. There were 501,842 household heads who were 34 years old or younger; and 398,044 husbands or partners. This is the base population with which the reasons for not attending school and the family academic background were processed.

The main reasons why household heads did not attend school were: Lack of money (30.3%), because they needed to work (28.8%) and because they considered that they were done (with school) (13.7%). On the contrary, the causes of lesser frequency were medical conditions and the need for special education. For the husband or partner, the first two reasons are the same as for the household heads, but in 30.3% and 18.8%. The third reason for not attending school is that they had to take care of domestic chores and/or the care of children and other household members (elderly, disabled, etc.), with 15.4%. The reasons for less frequency were due to illness and that there was no nearby educational center. Marrying or partnering, as well as pregnancy, had a low frequency, but as mentioned, due to the application of the survey, this can be hidden under the lack of money and the need to work.

When the head of the household or the husband or partner were attending school, only 10.1% did not perform (other) activities in their spare time. The three activities that they mostly did in their spare time were: walking (64.9%), eating out with friends or family (60.6%), and reading books (52.9%).

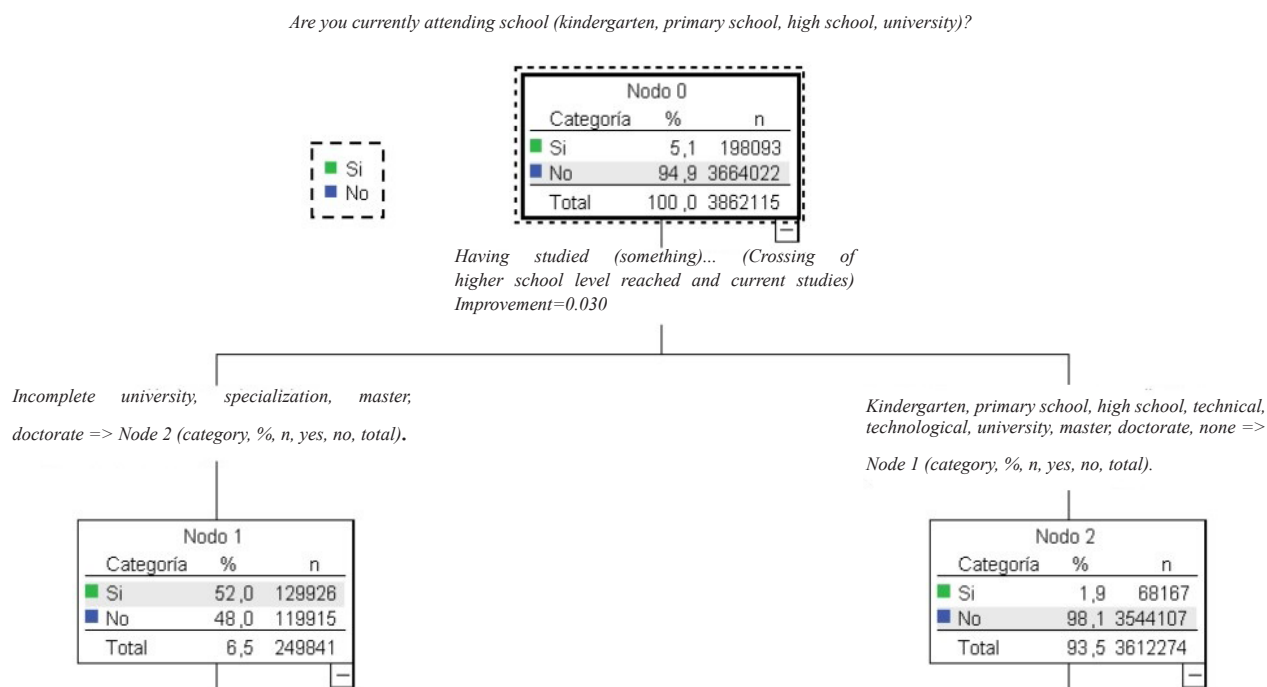
Characterization of household heads and husbands or partners

Taking into account that of the Bogota citizens who declared themselves as household heads, husbands

or partners, 5.1% (198.093) were attending school. Nodes 0, 1 and 2 of the decision tree show that, just as in the group of non-singles (aspect 1), the motivation to attend school was to obtain a higher education degree (see figure 7).

Of the household heads, husbands or partners who at some point in their lives had had access to higher education, 52% (129,926) were attending school. In contrast to those who already obtained a higher degree or stayed at the most basic levels of education, only 1.9% (68,167) were attending school.

Figure 7. Nodes 0, 1 and 2 for the decision tree for the question: *Are you currently attending school?* For the variable (located for household heads, husbands or partners): *Having studied (something)*...



Source: self-made.

Discussion

When examining the results of the processing of the data in the EM-2014 regarding the reasons why Bogota citizens stopped attending school, it was found that they were mainly: the lack of money, the need to work and the belief that they have already finished their studies. This section examines the results obtained through secondary sources of governmental origin, as well as other interested instances in the causes of school dropout, which have recent studies. This analysis is valuable because it establishes comparisons with experiences in other countries, and it corroborates the results.

In the first place, in the governmental sphere, the first two reasons for which a person has stopped attending school can be located in the explanatory variables of the socioeconomic determinant; and the third one in those of the individual determinant (Ministry of National Education, 2009, page 17).). The socioeconomic reasons could be hiding, perhaps because of the design and application of the question, reasons such as pregnancy, which is one individual determinant.

In addition, one of the principles set out in the National Development Plan is equity, which has announced that the extension of the school day in secondary education could diminish pregnancy in adolescence (National Planning Department, 2015, page 89). The justification given in the plan to focus efforts on reducing unplanned pregnancy is that it is disruptive in the process of social mobility, because it entails defections from the education system and early involvement in the labor market, as well as possible health problems (National Department of Planning, 2015, page 272). Thus, the exploration and deepening (explicitly, not veiled) on pregnancy as an explanatory variable of the individual determinant is relevant, and it is likely to be investigated in the following versions of the multipurpose survey given that it generates positive feedback cycles with other variables associated with dropping out of school.

Secondly, in the international arena, it can be highlighted that the first two reasons that the Bogota people exposed for not attending school are not strange. Something similar occurred in an opinion poll conducted by López, Salcedo, Casaravilla and Diconca about the social perception in Latin America and Spain about dropping out of school. Similarly, the two influential factors that lead the results in the mentioned survey were the economic problems and the incompatibility of the work with attending school (López, Salcedo, Casaravilla, & Diconca, 2013).

Regarding marital status as a predictor of abandonment, it can be mentioned that in a study conducted by Fiori & Ramírez at the University of the Republic of Uruguay (Udelar) they found proportionally direct relationships between the marital status of the students and school dropout (in that country, they refer to it as disaffiliation), with unmarried persons having a lower incidence of abandonment than the rest (Fiori & Ramírez, 2013), as it was the case in the present EM-2014 study.

Regarding the findings that advances in education levels are reflected in the improvement of social security, in terms of health and less dependence on the state for these and other needs, it can be added that if the improvement in these aspects

becomes a future aspiration for Bogota citizens, it would be a motivation (for them) to remain in school institutions, at different levels of education. This is assured taking into account that Viana & Rullán concluded for their case study that dropout rates are directly influenced by two variables: satisfaction and motivation towards school; and the level of future aspirations (Viana & Rullán, 2010). In addition, this finding is in line with what was stated by Swail in terms of the fact that society obtains economic and non-economic benefits when educational levels are increased (Swail, Reed, & Perna, 2003).

On the other hand, it would be important for a survey such as EM-2014 to deepen into the educational level of the mother who lives with the member of the family surveyed, since it is not possible an integral analysis of the family academic background if this is not investigated. According to Sánchez & Márquez, the mother's educational level correlates negatively with university dropout (Sánchez & Márquez, 2012). Furthermore, Altamirano & van Daalen report that when parents spend time in literacy programs, their children attend school more regularly, achieve higher IQ scores and are more likely to complete their studies (Altamirano & van Daalen, 2004).

Finally, in the international arena, Swail, Reed & Perna emphasize that the greatest benefit in obtaining university degrees is intergenerational, because future generations benefit from the educational achievements of their parents (Swail, Reed, & Perna, 2003). In this sense, it is gratifying to observe that the activities carried out by household heads and their spouses in their free time impact their families because they are promoted by adults who serve as referents.

Conclusions

For the year 2014 in Bogotá, the fact that a person defines their marital status as a single person is a factor that encourages their permanence in the formal education system. Only those non-single people who have had some type of contact with higher education show a stronger intention to remain in the formal education system than those who are not single, at the lower levels of education.

It is worrying that children aged between 5 and 14 years argue that they do not attend school because they are not aged for it or because they do not like to attend school. Surely this requires efforts with different approaches covering public policies, the training of teachers of pre-school and secondary education and the infrastructure of school institutions, as well as work on improving the school environment, to make children want to attend school.

Taking into account that a multipurpose survey is done by law, it would be advisable for future applications to inquire about other possible reasons why children stop attending school, especially for age groups 5-9 and 10-14. Apparently there are unidentified reasons that are grouped in the category *others*. In the reasons given by the adults, it could be attempted to investigate for reasons such as pregnancy, formulating the question and its options in a different way.

The results found in this processing of the base of the EM-2014 had concordance with similar studies carried out by scholars of school dropout. They also aligned with what the MEN and the National Development Plan divulged about it.

The availability of databases, such as those from the different applications of the multipurpose survey, is an advantage that different researchers with different disciplinary activities can exploit. The data is susceptible to be treated considering that the database is available, as well as the variable directory, the questionnaire and the city bulletins that SDP itself has advanced.

Given that the phenomenon of school drop-out is changing over time and its behavior is dynamic, it is important to have updated studies of the reasons why Bogotá citizens have stopped attending school. These reasons can be converted (or are) into explanatory variables on which performance indicators can be defined to be included in public policies intended to monitor and treat school dropouts. In addition, they can be taken into account in early warning systems that encourage the permanence of students in the school system.

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Footer

[1] For this purpose, see for example Barragán, Calderón, González, Rodríguez and Ruiz (Barragán, Calderón, González, Rodríguez, & Ruiz, 2015).

[2] Article 2 of Decree 16 of 1993, in subparagraph d) declares one of the functions of the SDP as to collect, provide and consolidate information, statistics, models and economic, social, cultural, environmental indicators, territorial, productivity and competitiveness, for the decision making of the District Administration; and that it allows the national and international promotion of the Capital District.

[3] The GUIA project has had 20 Higher Education Institutions (two private and the rest public), located in 12 Latin American and four European countries. It also counts as a member of the Columbus Association.

[4] When referring to the spouse or partner of the household head, it will refer only to the husband or partner, although in the SDP documentation the distinction is made by sex. This simplification is made to facilitate reading.

[5] The complete questionnaire can be found here: http://www.sdp.gov.co/portal/page/portal/PortalSDP/Encuesta_Multiproposito_2014/Documentos/Formulario_Multiproposito_2014.pdf

[6] The database is available here: http://www.sdp.gov.co/PortalSDP/Encuesta_Multiproposito_2014/Documentos

[7] The Mayor's Office of Bogotá has detailed information on each of the locations at: <http://www.bogota.gov.co/localidades/>

[8] Which may indicate that the density is very close to zero.

[9] Here it was found that 2.2% of people aged between 75 and 79 years were attending kindergarten, which may be due to a defect in the taking of information.

[10] There were found 13 household heads aged between 55-59 years, and 7 aged between 75-79 years attending kindergarten. This may be due to a defect in the registration of the information at the time of the application of the survey.