

ANALYSIS OF THE EFFICIENCY OF HIGHER EDUCATION IN COLOMBIA BY DEPARTMENT FROM THE INCOMING VARIABLES COVERAGE AND ENROLLMENT

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Abstract

The purpose of the following article is to analyze the efficiency of higher education in Colombia by departments specifically in the incoming and outgoing variables of Higher Education institutions in the departments of Colombia in the years 2013, 2015, 2017 and 2019 that are part of the measurement of efficiency, it can be concluded that the variable of coverage rate in higher education at the departmental level during the years of study and its percentage representation in each department involved, the department with the highest coverage rate is the district of Bogota, being the only one that is part of the range of 66% to 100%, followed by departments in the range of 33% to 66%, represented by 14 departments such as: Quindío, Santander, Risaralda, Boyacá, Atlántico, Antioquia, Caldas, Norte de Santander, Valle del Cauca, Tolima, Bolívar, Huila, Meta and Cauca, but the highest concentration is in the 10% to 33% range, made up of 14 departments comprising Guaviare, Cesar, Magdalena, Cundinamarca, Caquetá, San Andrés, Sucre, Choco, Nariño, Casanare, Córdoba, La guajira, Arauca and Guainía.

Keywords: Teaching, efficiency, higher education, Colombia, departments.

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Resumen

El propósito del siguiente artículo es analizar la eficiencia de la educación superior en Colombia por departamentos específicamente en la variables entrantes y salientes de las instituciones de Educación Superior en los departamentos de Colombia en los años 2013, 2015, 2017 y 2019 que son parte de la medición de la eficiencia, se puede concluir que la variable de tasa de cobertura en la educación superior a nivel departamental durante los años de estudio y su representación porcentual en cada departamento que interviene, el departamento con mayor tasa de cobertura es el distrito de Bogotá, siendo el único que hace parte del rango del 66% al 100%, seguido por departamentos en el rango del 33% al 66%, representado por 14 departamentos como son: Quindío, Santander, Risaralda, Boyacá, Atlántico, Antioquia, Caldas, Norte de Santander, Valle del Cauca, Tolima, Bolívar, Huila, Meta y Cauca, pero la mayor concentración se da en el rango del 10% al 33%, compuesto por 14 departamentos conformado por Guaviare, Cesar, Magdalena, Cundinamarca, Caquetá, San Andrés, Sucre, Choco, Nariño, Casanare, Córdoba, La guajira, Arauca y Guainía.

Palabras claves: Docencia, eficiencia, educación superior, Colombia, departamentos.

Introduction

In recent decades, the trend of higher education worldwide increased the demands for the quality of education under established parameters that help regulate the operation of HEI (Higher Education Institutions). This requirement asks governments to generate continuous review and evaluation processes for educational quality.

Thus, it is important to inquire about which variables affected the efficiency of higher education in the departments of Colombia in the years 2013, 2015, 2017 and 2019.

From this perspective, the incoming variables (inputs), composed of the coverage rate, enrollment and teachers and the outgoing variables (outputs), composed of the dropout rate, graduates and research, become relevant to deepen our central theme, being these variables an indicator to measure the efficiency of higher education, it is required to regulate and maintain a balance between the incoming and outgoing variables, therefore, the respective analyses of the incoming variables (inputs) coverage rate and enrollment, in the departments of Colombia, will be shown in the results.

However, from an international perspective, Colombia's coverage rate is relatively low compared to developed countries such as the United States, Finland, Spain, New Zealand, Australia, and Norway and Latin American countries such as Argentina and Chile, whose coverage rates exceed 80%. Colombia represented 47%, and in terms of dropout rates, the indicators reveal a worrying situation where it is concluded that, on average, one out of every two students does not complete their higher education studies by the level of training. For 2015, the dropout rate per period for the technical level was 32.6%, for the technological level 18%, and for the university level, it was 9.3%; for its part, the dropout rate per cohort represented 56.9% for the technical level, 52.1% for the technological level and 46.1% for the university level.

Through the percentage figures and its position range at the departmental level, it can be seen that in the coverage rate, the district of Bogotá is the leader with 9%, followed by the departments of Quindío with 5.2% and Santander with 5.1%, as for enrollments, they are made up of the official sector with a representation of 51%, and in the private sector with 49%, The District of Bogotá leads in the number of enrolled students with 32.14%, where the highest concentration is in the private sector with 69%, and the highest representation of enrollment is in the undergraduate sector with 63.2%, followed by the technological level with 26.4%.

The training of teachers is reflected in their academic level, with a higher representation in postgraduate master's degrees at 35.1%, followed by professional training at 30.7%, the lowest is the doctorate with 8% and postdoctoral with 0.2%. The district of Bogota leads the way with a concentration of teachers of 40.6%; the highest degree is master's with 34.1% and specialization with 29.4%, followed by Antioquia which concentrates 16.7% of teachers, where they are mainly trained at master's level 38.4% and professional 26.2%.

Furthermore, concerning the type of contract, the highest representation in Colombia is that of professors with 53.8%, followed by full-time with 35%, where the department of Tolima, 71% of the total number of its teachers, is composed of professors, which leads to its representation. On the other hand, the district of Bogota, which is the leader in the representation of teachers at the national level, is composed of 50% of professors, 36% full time and 14% part-time. Finally, about the graduates variable, the level of education with the highest representation is undergraduate, with 43.6%, followed by a technologist, with 28%.

The data at the national level concerning the desertion variable in 2013 represented 9.1%, in 2015 9%, in 2017 9.1%, and for the year 2019, there is no information in SPADIES. According to these data, the department that leads in the desertion of students in higher education is the department of Vichada, represented by 25.6%, followed by Amazonas at 22.3%, and the department with the least desertion is Caldas with 6.5%, followed by Boyacá with 6.9%.

One of the most important processes evaluation indicators is efficiency, as it is the measure of results obtained in terms of the resources invested, where the results contribute to the analysis for decision-making and ensure that higher education is an investment for the fulfillment of the development of the regions, being of importance for the process carried out by the national accreditation council CNA, through the High-Quality Accreditation Model, where it allows evaluating the application of the current regulations in the HEI's and also to follow up on the educational service they offer to promote the suitability and soundness of the institutions and academic programs, allowing them to be internationally competitive, and allowing benefits such as the validation of degrees and the mobility of students and professors through regional cooperation programs, as mentioned by the Universidad Nacional de Colombia.

The current political context for the accreditation of quality in higher education points to this period as one of the maturities of the system and autonomy of the institutions.

Quality in higher education in Colombia begins to be structured and monitored by the State, through the Ministry of National Education and the National Council of Higher Education, which in turn organizes the National Accreditation Council and the National System of Higher Education Information, as well as the creation of the Information System for Quality Assurance in Higher Education, the System for the Prevention of Dropout in Higher Education and the Labor Observatory for Education, these are the systems that help to regulate and organize the information of universities in Colombia.

The normative framework broadens the scope and impact of Higher Education in Colombia through Article 67 of the 1991 Constitution, which states that education is a right of the individual and a public service with a social function; it seeks access to knowledge, science, technology and other cultural goods and values, and established the guidelines that are in force today and that gave support to the issuance of Law 30 of 1992, which expresses the rules through which the organization of the public service of Higher Education is regulated.

By which Article 67 and paragraphs 21, 22 and 26 of Article 189 of the Political Constitution are partially developed, the inspection and surveillance of higher education are regulated, Law 30 of 1992 is partially modified, and other provisions are enacted. It establishes that while the requirements for the creation and operation of undergraduate academic programs that higher education institutions may offer are being determined, these must submit to the Ministry of National Education through the Colombian Institute for the Promotion of Higher Education in order to ensure compliance with the purposes of education, the information related to the corresponding program.

Methodology

The methodology is retaken as the access route to the data analyzed in the following research through a quantitative research approach, which allows knowing the object of study from its nature and depth through the data obtained, as it is mentioned, “offers the possibility of generalizing the results more widely, and grants control over the phenomena, as well as a point of view based on counts and magnitudes.” In this research, the information evidenced in primary bases will be retaken to analyze it through statistical processes that will allow interpretation of how the universities are in terms of efficiency and the impact this has on economic development by departments.

First, several characteristics or variables are not subject to or amenable to, experimental manipulation. As well as, for ethical considerations, some variables cannot or should not be manipulated. In some cases, independent variables appear, and it is impossible to establish control over them.

It is descriptive in scope and seeks to characterize, expose, describe, present or identify aspects of a given variable. In this research, the variables with the dimensions that characterize the effectiveness of universities at the departmental level will be analyzed, and the current education

situation at the departmental level will be evidenced. It is descriptive in scope and seeks to characterize, expose, describe, present or identify aspects of a given variable (Arguedas, 2009). In this research, the variables will be analyzed with the dimensions that characterize the effectiveness of the universities at the departmental level, and by exposing these data, they will be analyzed. The current situation of education at the departmental level will be evidenced.

The form of the distribution of the random variable and the statistics derived from the data are taken from the database of the Ministry of Education, SNIES, SPADIES, Min sciences, taking the information of 28 departments of Colombia, as for the parametric statistics it is assumed that the populations of the extracted sample have a normal distribution. This property is necessary for the hypothesis test to be valid. Quispe, Calla, (2019).

Table 1 Classification of Variables, Component Dimensions and Indicators

| INCOMING (INPUTS) | | |
|--------------------------|--|--|
| Variable | Dimension | Indicator |
| COVERAGE RATE | Coverage | Percentage by department vs. national |
| | Enrolled by sector: Official and private | Number of enrollees by sector: Official and private |
| REGISTERED | Enrolled students by level of education | Number of enrolled students by level of education: Professional Technical, Technological, University, Specialization, Master's, Doctorate. |

Data processing

Taking up the background research, the variables with their respective dimensions are theoretically determined as mentioned in Table 1, and then, the description of the collection and analysis of the information through the following phases is related:

Phase 1: Data collection

The search for data was carried out in the following secondary sources through the Ministry of Education: National System of Higher Education Information (SNIES), in its report by the department of the summary of general statistics on higher education, which contains the information of the years of study of the variables of coverage rate, enrollment, enrollment and enrollment.

Phase 2: Consolidation of information

The information compiled in the reports provided by the Ministry of Education through the SNIES source, the information is downloaded in Excel format by department, where a matrix is

prepared for the consolidation of the information, composed of the departments under study, as well as the variables with their dimensions, classified by years, as shown in Tables 2, 3 and 4, where some years that have been analyzed can be seen.

Table 2. Matrix of variables by department, dimensions and years.

| DEPARTAMENTO | TASA COBERTURA | | | Matrícula por sector | | | | | | | | | Matrícula por nivel académico | | | | | | | | | Matrícula por nivel de formación | | | | | | | | | Graduados por nivel de formación | | | | | | | | | Tasa de deserción universitaria | | |
|--------------------|----------------|--------|-------|----------------------|---------|---------|--------|---------|---------|-------|----------|----------|-------------------------------|----------|----------|--------|---------|--------|---------|--------|--------|----------------------------------|--------|-------|--------|----------|-------------|----------|-----------|---------|----------------------------------|-------|------|------|--|--|------|--|--|---------------------------------|--|--|
| | 2013 | | | 2015 | | | 2013 | | | 2015 | | | 2013 | | | 2015 | | | 2013 | | | 2015 | | | 2013 | | | 2015 | | | 2013 | | | 2015 | | | 2019 | | | | | |
| | Departa | Nacion | Depta | Nacion | Oficial | Privada | Total | Oficial | Privada | Total | Pregrado | Posgrado | Total | Pregrado | Posgrado | Total | Técnica | Tecnol | Univers | Especi | Maestr | Doctora | Total | Geoa | Profec | ecología | Universitar | ecializa | Maestrior | doctora | Gen | 2013 | 2015 | 2019 | | | | | | | | |
| AMAZONAS | 11% | 47% | 8% | 51% | 512 | 221 | 733 | 430 | 172 | 602 | 703 | 30 | 733 | 549 | 53 | 602 | 82 | 292 | 329 | 10 | 17 | 3 | 733 | 51 | 35 | 35 | 5 | 11 | 0 | 137 | 18,6% | 26,7% | - | | | | | | | | | |
| ANTIQUQUIA | 51% | 47% | 54% | 51% | 180477 | 113988 | 294465 | 187362 | 128049 | 3E+05 | 279585 | 14880 | 294465 | 298127 | 17284 | 315411 | 4269 | 1E+05 | 164092 | 9051 | 4862 | 967 | 294465 | 1464 | 19398 | 19157 | 7259 | 1421 | 96 | 48795 | 8,4% | 8,0% | - | | | | | | | | | |
| ARAUCA | 17% | 47% | 14% | 51% | 1163 | 2316 | 3479 | 1043 | 1827 | 2870 | 394 | 85 | 3479 | 2851 | 19 | 2870 | 7 | 1148 | 2239 | 85 | 0 | 0 | 3479 | 15 | 219 | 170 | 1 | 0 | 0 | 405 | 10,6% | 10,4% | - | | | | | | | | | |
| ATLÁNTICO | 50% | 47% | 60% | 51% | 47247 | 63643 | 110890 | 55039 | 75414 | 1E+05 | 105969 | 4921 | 110890 | 125584 | 4869 | 130453 | 6438 | 26231 | 73300 | 3333 | 1534 | 54 | 110890 | 818 | 2854 | 8516 | 2536 | 506 | 11 | 15241 | 10,8% | 10,9% | - | | | | | | | | | |
| BOGOTÁ | 93% | 47% | 102% | 51% | 217302 | 436578 | 653880 | 228258 | 506055 | 7E+05 | 604335 | 49545 | 653880 | 667412 | 66901 | 734313 | 39971 | 2E+05 | 413636 | 30151 | 17636 | 1758 | 653880 | 7379 | 25100 | 52621 | 26028 | 4631 | 134 | 115893 | 9,0% | 9,5% | - | | | | | | | | | |
| BOLÍVAR | 39% | 47% | 41% | 51% | 35807 | 36927 | 72734 | 37456 | 39627 | 77083 | 70580 | 2154 | 72734 | 74764 | 2319 | 77083 | 1982 | 30590 | 38008 | 1740 | 359 | 55 | 72734 | 556 | 3585 | 4958 | 1364 | 114 | 1 | 10578 | 13,8% | 9,6% | - | | | | | | | | | |
| BOYACÁ | 49% | 47% | 54% | 51% | 43904 | 17701 | 61005 | 45011 | 17296 | 62307 | 53936 | 7069 | 61005 | 57355 | 4952 | 62307 | 671 | 14276 | 38989 | 5883 | 1090 | 96 | 61005 | 365 | 2287 | 4283 | 3728 | 169 | 2 | 10834 | 5,9% | 6,9% | - | | | | | | | | | |
| CALDAS | 47% | 47% | 52% | 51% | 28303 | 14085 | 42388 | 29753 | 16838 | 46591 | 38578 | 3810 | 42388 | 41727 | 4864 | 46591 | 918 | 12265 | 25395 | 1055 | 2601 | 154 | 42388 | 785 | 2192 | 3537 | 1235 | 925 | 24 | 8698 | 5,4% | 4,9% | - | | | | | | | | | |
| CAQUETÁ | 28% | 47% | 31% | 51% | 9835 | 337 | 10172 | 11271 | 276 | 11547 | 9816 | 356 | 10172 | 11070 | 477 | 11547 | 171 | 1493 | 8152 | 232 | 124 | 0 | 10172 | 69 | 271 | 924 | 199 | 33 | 0 | 1496 | 9,1% | 9,7% | - | | | | | | | | | |
| CASANARE | 25% | 47% | 26% | 51% | 3814 | 5026 | 8840 | 3345 | 6402 | 9747 | 8722 | 118 | 8840 | 9452 | 295 | 9747 | 167 | 2169 | 6386 | 91 | 27 | 0 | 8840 | 0 | 461 | 394 | 60 | 0 | 0 | 915 | 12,9% | 14,3% | - | | | | | | | | | |
| CAUCA | 28% | 47% | 31% | 51% | 27625 | 9977 | 37602 | 31042 | 12428 | 43470 | 36517 | 1085 | 37602 | 42008 | 1462 | 43470 | 65 | 11470 | 24982 | 705 | 301 | 79 | 37602 | 22 | 2077 | 2398 | 571 | 30 | 7 | 5105 | 7,6% | 9,7% | - | | | | | | | | | |
| CESAR | 29% | 47% | 30% | 51% | 24100 | 5474 | 29574 | 26125 | 5957 | 32082 | 29406 | 168 | 29574 | 31886 | 196 | 32082 | 174 | 7580 | 21652 | 165 | 3 | 0 | 29574 | 39 | 1025 | 2012 | 282 | 9 | 0 | 3367 | 12,7% | 12,0% | - | | | | | | | | | |
| CHOCÓ | 27% | 47% | 26% | 51% | 11831 | 1272 | 13103 | 11881 | 1446 | 13327 | 12933 | 170 | 13103 | 12928 | 399 | 13327 | 151 | 1234 | 11548 | 114 | 56 | 0 | 13103 | 133 | 267 | 1214 | 188 | 10 | 0 | 1812 | 10,4% | 11,3% | - | | | | | | | | | |
| CÓRDOBA | 22% | 47% | 23% | 51% | 20395 | 16524 | 36919 | 19420 | 18799 | 38219 | 36297 | 622 | 36919 | 37108 | 1111 | 38219 | 1450 | 6023 | 28824 | 560 | 62 | 0 | 36919 | 233 | 766 | 3505 | 455 | 51 | 0 | 5010 | 9,8% | 9,4% | - | | | | | | | | | |
| CUNDINAMARCA | 28% | 47% | 31% | 51% | 46789 | 19161 | 65950 | 54061 | 22973 | 77034 | 63594 | 2356 | 65950 | 73134 | 3900 | 77034 | 1215 | 29408 | 32971 | 1649 | 687 | 20 | 65950 | 1758 | 5784 | 3018 | 991 | 352 | 0 | 11903 | 6,8% | 8,1% | - | | | | | | | | | |
| GUAINIÁ | 14% | 47% | 15% | 51% | 437 | 6 | 443 | 521 | 41 | 562 | 427 | 16 | 443 | 552 | 10 | 562 | 2 | 221 | 204 | 13 | 3 | 0 | 443 | 6 | 81 | 9 | 2 | 0 | 0 | 98 | 12,0% | 21,9% | - | | | | | | | | | |
| GUAVIARE | 37% | 47% | 35% | 51% | 1991 | 60 | 2041 | 2106 | 83 | 2189 | 2020 | 21 | 2041 | 2177 | 12 | 2189 | 0 | 1518 | 502 | 21 | 0 | 0 | 2041 | 0 | 242 | 25 | 17 | 0 | 0 | 284 | 15,7% | 22,0% | - | | | | | | | | | |
| HUILA | 33% | 47% | 36% | 51% | 24214 | 10995 | 35209 | 26018 | 12014 | 38032 | 34213 | 996 | 35209 | 36835 | 1197 | 38032 | 717 | 10158 | 23338 | 892 | 104 | 0 | 35209 | 151 | 1549 | 2723 | 443 | 30 | 0 | 4896 | 9,2% | 9,5% | - | | | | | | | | | |
| LA GUAJIRA | 19% | 47% | 26% | 51% | 13329 | 455 | 13784 | 20101 | 180 | 20281 | 13659 | 125 | 13784 | 20194 | 87 | 20281 | 1012 | 3652 | 8995 | 80 | 45 | 0 | 13784 | 133 | 634 | 823 | 50 | 0 | 0 | 1640 | 11,7% | 13,6% | - | | | | | | | | | |
| MAGDALENA | 30% | 47% | 32% | 51% | 28420 | 8641 | 37061 | 30321 | 9150 | 39471 | 36314 | 747 | 37061 | 38543 | 928 | 39471 | 3459 | 7706 | 25149 | 672 | 74 | 1 | 37061 | 449 | 1429 | 3281 | 771 | 48 | 0 | 5978 | 7,5% | 7,2% | - | | | | | | | | | |
| META | 34% | 47% | 35% | 51% | 13266 | 16840 | 30106 | 13215 | 18973 | 32188 | 29172 | 934 | 30106 | 31233 | 955 | 32188 | 762 | 5387 | 23023 | 844 | 90 | 0 | 30106 | 269 | 1130 | 2516 | 626 | 3 | 0 | 4544 | 10,4% | 10,3% | - | | | | | | | | | |
| NARIÑO | 24% | 47% | 25% | 51% | 18924 | 18111 | 37035 | 18529 | 19902 | 38431 | 35767 | 1268 | 37035 | 37171 | 1260 | 38431 | 513 | 7126 | 18128 | 799 | 435 | 34 | 37035 | 50 | 1625 | 3438 | 606 | 99 | 0 | 5818 | 8,8% | 8,3% | - | | | | | | | | | |
| NORTE DE SANTANDER | 46% | 47% | 51% | 51% | 47509 | 13212 | 60721 | 54614 | 12971 | 67585 | 58952 | 1769 | 60721 | 65916 | 1669 | 67585 | 1124 | 12486 | 45342 | 1240 | 529 | 0 | 60721 | 170 | 2295 | 9266 | 993 | 96 | 0 | 12820 | 10,5% | 8,8% | - | | | | | | | | | |
| PUTUMAYO | 12% | 47% | 18% | 51% | 3187 | 560 | 3747 | 4927 | 810 | 5737 | 3668 | 79 | 3747 | 5684 | 53 | 5737 | 119 | 2422 | 1127 | 78 | 1 | 0 | 3747 | 3 | 548 | 126 | 38 | 0 | 0 | 715 | 11,1% | 26,2% | - | | | | | | | | | |
| QUINDIÓ | 61% | 47% | 61% | 51% | 22669 | 7065 | 29734 | 21605 | 8115 | 29720 | 29228 | 506 | 29734 | 28632 | 1088 | 29720 | 1242 | 7592 | 20394 | 386 | 105 | 15 | 29734 | 302 | 1403 | 2618 | 382 | 39 | 2 | 4746 | 8,3% | 7,0% | - | | | | | | | | | |
| RISARALDA | 51% | 47% | 58% | 51% | 26938 | 17512 | 44450 | 30273 | 19708 | 49981 | 41913 | 2537 | 44450 | 46566 | 3415 | 49981 | 1325 | 11723 | 28865 | 1482 | 1012 | 43 | 44450 | 180 | 1996 | 3203 | 878 | 207 | 5 | 6469 | 7,3% | 7,9% | - | | | | | | | | | |
| SAN ANDRÉS Y PROV | 24% | 47% | 33% | 51% | 1277 | 24 | 1301 | 1699 | 12 | 1711 | 1274 | 27 | 1301 | 1683 | 28 | 1711 | 194 | 1011 | 69 | 0 | 23 | 4 | 1301 | 18 | 107 | 0 | 2 | 4 | 0 | 131 | 3,6% | 5,6% | - | | | | | | | | | |
| SANTANDER | 58% | 47% | 62% | 51% | 68337 | 60441 | 128778 | 69984 | 59539 | 1E+05 | 110255 | 18523 | 128778 | 115868 | 13655 | 129523 | 1702 | 45152 | 63401 | 15407 | 3028 | 88 | 128778 | 546 | 6036 | 7972 | 7178 | 423 | 3 | 22158 | 8,0% | 7,4% | - | | | | | | | | | |
| SUCRE | 23% | 47% | 25% | 51% | 7453 | 11883 | 19336 | 8371 | 12277 | 20648 | 18280 | 1056 | 19336 | 20331 | 317 | 20648 | 1490 | 1587 | 15203 | 997 | 59 | 0 | 19336 | 141 | 528 | 1833 | 644 | 0 | 0 | 3146 | 12,0% | 10,5% | - | | | | | | | | | |
| TOLIMA | 39% | 47% | 41% | 51% | 32089 | 15609 | 47698 | 32792 | 15910 | ##### | 46086 | 1.612 | 47698 | 47681 | 1.021 | 48702 | 3.760 | ##### | 27.623 | 1.170 | 432 | 10 | 47698 | 1.336 | 3.141 | 4.899 | 991 | 114 | 1 | 10.482 | 10,3% | 10,1% | - | | | | | | | | | |
| VALLE DEL CAUCA | 39% | 47% | 44% | 51% | 80221 | 78205 | 158426 | 90389 | 82382 | 2E+05 | 150234 | 8192 | 158426 | 163585 | 9176 | 17771 | 7843 | 48327 | 94064 | 3584 | 4189 | 419 | 158426 | 1816 | 8824 | 12241 | 3301 | 1264 | 44 | 27490 | 9,4% | 8,8% | - | | | | | | | | | |
| VAUPÉS | 17% | 47% | 7% | 51% | 359 | 0 | 359 | 227 | 1 | 228 | 359 | 0 | 359 | 193 | 35 | 228 | 0 | 344 | 15 | 0 | 0 | 0 | 359 | 0 | 46 | 0 | 7 | 0 | 0 | 53 | 34,6% | 0,0% | - | | | | | | | | | |
| VICHADA | 11% | 47% | 8% | 51% | 711 | 56 | 767 | 699 | 35 | 734 | 756 | 11 | 767 | 705 | 29 | 734 | 21 | 581 | 154 | 11 | 0 | 0 | 767 | 4 | 110 | 17 | 2 | 0 | 0 | 133 | 31,3% | 23,7% | - | | | | | | | | | |

Source. Own elaboration based on SNIES reports.

Phase 3: Data processing: analysis by year

The data processing is carried out in the order mentioned above and is done through a descriptive analysis by averages using the following formula:

$$\bar{X} = \frac{x_1 + x_2 + x_3 + x_4 + \dots + x_n}{N}$$

Where the dimensions of each variable were applied per year to obtain its representation in the time analyzed and to be able to identify its behavior, the following Table 5 shows one of the dimensions of the variables studied.

Table 3. Representation by year, by variable and dimension.

Source. Own elaboration based on SNIES reports.

Detalle de las matrículas por Sector, por año y su representación total

| AÑO | MATRICULAS POR SECTOR | | TOTAL | REPRESENTACIÓN |
|------------------|-----------------------|------------------|------------------|----------------|
| | OFICIAL | PRIVADA | | |
| AÑO 2013 | 1,086,638 | 1,002,345 | 2,088,983 | 22.7% |
| AÑO 2015 | 1,162,961 | 1,124,852 | 2,287,813 | 24.8% |
| AÑO 2017 | 1,238,121 | 1,203,822 | 2,441,943 | 26.5% |
| AÑO 2019 | 1,213,196 | 1,177,579 | 2,390,775 | 26.0% |
| TOTAL | 4,700,916 | 4,508,598 | 9,209,514 | |
| REPRESENTACIÓN % | 51.0% | 49.0% | 100% | |

Nota. Elaboración propia

| AÑO | MATRICULAS POR SECTOR | | TOTAL |
|--------------|-----------------------|-------------|-------------|
| | OFICIAL | PRIVADA | |
| AÑO 2013 | 23.1% | 22.2% | 15.3% |
| AÑO 2015 | 24.7% | 24.9% | 19.4% |
| AÑO 2017 | 26.3% | 26.7% | 21.1% |
| AÑO 2019 | 25.8% | 26.1% | 26.1% |
| TOTAL | 100% | 100% | 100% |

| AÑO | MATRICULAS POR SECTOR | | TOTAL |
|----------|-----------------------|---------|-------|
| | OFICIAL | PRIVADA | |
| AÑO 2013 | 52.0% | 48.0% | 100% |
| AÑO 2015 | 50.8% | 49.2% | 100% |
| AÑO 2017 | 50.7% | 49.3% | 100% |
| AÑO 2019 | 50.7% | 49.3% | 100% |

Phase 4: Data processing: departmental analysis

In turn, the information obtained in the years of study is consolidated by the department in order to determine their representation and classified by percentage ranges that show the position by department, as shown in Table 4, with one of the dimensions of the variables studied.

Table 4. Total representation by department and by dimension

| Representación total de matrículas por sector y su representación porcentual | | | | | | |
|--|------------------|------------------|------------------|--|--|-------------------------------------|
| DEPARTAMENTO /MATRICULA POR | Oficial | Privada | Total Matrículas | Representación % del Total matrículas Sector Oficial | Representación % del Total matrículas Sector Privada | Representación Total x departamento |
| AMAZONAS | 2.328 | 612 | 2.940 | 79,2% | 20,8% | 100% |
| ANTIOQUIA | 757.863 | 518.411 | 1.276.274 | 59,4% | 40,6% | 100% |
| ARAUCA | 4.428 | 7.227 | 11.655 | 38,0% | 62,0% | 100% |
| ATLÁNTICO | 213.593 | 297.609 | 511.202 | 41,8% | 58,2% | 100% |
| BOGOTÁ | 917.329 | 2.042.566 | 2.959.895 | 31,0% | 69,0% | 100% |
| BOLÍVAR | 151.555 | 151.648 | 303.203 | 50,0% | 50,0% | 100% |
| BOYACÁ | 185.533 | 73.204 | 258.737 | 71,7% | 28,3% | 100% |
| CALDAS | 118.801 | 70.915 | 189.716 | 62,6% | 37,4% | 100% |
| CAQUETÁ | 45.273 | 873 | 46.146 | 98,1% | 1,9% | 100% |
| CASANARE | 14.717 | 24.684 | 39.401 | 37,4% | 62,6% | 100% |
| CAUCA | 132.113 | 51.272 | 183.385 | 72,0% | 28,0% | 100% |
| CESAR | 112.799 | 24.228 | 137.027 | 82,3% | 17,7% | 100% |
| CHOCÓ | 48.236 | 6.478 | 54.714 | 88,2% | 11,8% | 100% |
| CÓRDOBA | 82.727 | 74.479 | 157.206 | 52,6% | 47,4% | 100% |
| CUNDINAMARCA | 226.396 | 82.221 | 308.617 | 73,4% | 26,6% | 100% |
| GUAINÍA | 2.191 | 89 | 2.280 | 96,1% | 3,9% | 100% |
| GUAVIARE | 8.088 | 401 | 8.489 | 95,3% | 4,7% | 100% |
| HUILA | 108.655 | 47.058 | 155.713 | 69,8% | 30,2% | 100% |
| LA GUAJIRA | 74.752 | 1.746 | 76.498 | 97,7% | 2,3% | 100% |
| MAGDALENA | 112.638 | 40.525 | 153.163 | 73,5% | 26,5% | 100% |
| META | 54.343 | 70.759 | 125.102 | 43,4% | 56,6% | 100% |
| NARIÑO | 80.336 | 80.670 | 161.006 | 49,9% | 50,1% | 100% |
| NORTE DE SANTANDER | 220.171 | 50.322 | 270.493 | 81,4% | 18,6% | 100% |
| QUINDÍO | 86.561 | 28.835 | 115.396 | 75,0% | 25,0% | 100% |
| RISARALDA | 119.640 | 76.718 | 196.358 | 60,9% | 39,1% | 100% |
| SAN ANDRÉS Y PROVIDENCIA | 5.915 | 60 | 5.975 | 99,0% | 1,0% | 100% |
| SANTANDER | 274.443 | 235.665 | 510.108 | 53,8% | 46,2% | 100% |
| SUCRE | 34.536 | 57.029 | 91.565 | 37,7% | 62,3% | 100% |
| TOLIMA | 136.701 | 61.888 | 198.589 | 68,8% | 31,2% | 100% |
| VALLE DEL CAUCA | 364.592 | 330.287 | 694.879 | 52,5% | 47,5% | 100% |
| VAUPÉS | 956 | 1 | 957 | 99,9% | 0,1% | 100% |
| VICHADA | 2.707 | 118 | 2.825 | 95,8% | 4,2% | 100% |
| Nota. Elaboración propia fuente | 4.700.916 | 4.508.598 | 9.209.514 | | | |

Source. Own elaboration based on SNIES reports.

Phase 5: Data processing: analysis by departments and variation by years

Consolidation and comparison by year is carried out, allowing us to identify their behavior during the years of study, as shown in Table 4, with one of the dimensions of the variables studied:

Table 5. Total representation by department, by dimension and by year

| DEPARTAMENTO /MATRÍCULA POR SECTOR | Oficial 2013 | Oficial 2015 | Oficial 2017 | Oficial 2019 | DEPARTAMENTO /MA | Oficial 2013 | DEPARTAMENTO /M | Oficial 2015 | DEPARTAMENTO /M | Oficial 2017 | DEPARTAMENTO / | Oficial 2019 | % A COMPARAR | VARIACIONES |
|------------------------------------|--------------|--------------|--------------|--------------|--------------------------|--------------|--------------------------|--------------|--------------------------|--------------|--------------------------|--------------|--------------|-------------|
| AMAZONAS | 512 | 430 | 618 | 768 | BOGOTÁ | 20,0% | BOGOTÁ | 19,6% | BOGOTÁ | 19,6% | BOGOTÁ | 18,9% | 20,0% | -1,1% |
| ANTIOQUIA | 180.477 | 187.362 | 196.946 | 193.078 | ANTIOQUIA | 16,6% | ANTIOQUIA | 16,1% | ANTIOQUIA | 15,9% | ANTIOQUIA | 15,9% | 16,6% | -0,7% |
| ARAUCA | 1.163 | 1.043 | 1.170 | 1.052 | VALLE DEL CAUCA | 7,4% | VALLE DEL CAUCA | 7,8% | VALLE DEL CAUCA | 7,9% | VALLE DEL CAUCA | 8,0% | 7,4% | 0,6% |
| ATLÁNTICO | 47.247 | 55.039 | 57.869 | 53.438 | SANTANDER | 6,3% | SANTANDER | 6,0% | SANTANDER | 5,6% | SANTANDER | 5,5% | 6,3% | -0,8% |
| BOGOTÁ | 217.302 | 228.258 | 242.640 | 229.129 | NORTE DE SANTANDER | 4,4% | ATLÁNTICO | 4,7% | CUNDINAMARCA | 5,2% | CUNDINAMARCA | 5,1% | 4,3% | 0,8% |
| BOLÍVAR | 35.807 | 37.456 | 39.268 | 39.024 | ATLÁNTICO | 4,3% | NORTE DE SANTANDER | 4,7% | NORTE DE SANTANDER | 4,8% | NORTE DE SANTANDER | 4,9% | 4,4% | 0,5% |
| BOYACÁ | 43.304 | 45.011 | 48.635 | 48.583 | CUNDINAMARCA | 4,3% | CUNDINAMARCA | 4,6% | ATLÁNTICO | 4,7% | ATLÁNTICO | 4,4% | 4,3% | 0,1% |
| CALDAS | 28.303 | 29.753 | 30.277 | 30.468 | BOYACÁ | 4,0% | BOYACÁ | 3,9% | BOYACÁ | 3,9% | BOYACÁ | 4,0% | 4,0% | 0,0% |
| CAQUETÁ | 9.835 | 11.271 | 12.099 | 12.068 | BOLÍVAR | 3,3% | BOLÍVAR | 3,2% | BOLÍVAR | 3,2% | BOLÍVAR | 3,2% | 3,3% | -0,1% |
| CASANARE | 3.814 | 3.345 | 3.409 | 4.149 | TOLIMA | 3,0% | TOLIMA | 2,8% | CAUCA | 3,0% | CAUCA | 3,0% | 2,5% | 0,5% |
| CAUCA | 27.625 | 31.042 | 37.132 | 36.314 | MAGDALENA | 2,6% | CAUCA | 2,7% | TOLIMA | 2,9% | TOLIMA | 2,9% | 3,0% | 0,0% |
| CESAR | 24.100 | 26.125 | 30.823 | 31.751 | CALDAS | 2,6% | MAGDALENA | 2,6% | RISARALDA | 2,6% | CESAR | 2,6% | 2,2% | 0,4% |
| CHOCÓ | 11.831 | 11.881 | 11.680 | 12.844 | CAUCA | 2,5% | RISARALDA | 2,6% | CESAR | 2,5% | CALDAS | 2,5% | 2,6% | -0,1% |
| CÓRDOBA | 20.395 | 19.420 | 21.308 | 21.604 | RISARALDA | 2,5% | CALDAS | 2,6% | CALDAS | 2,4% | RISARALDA | 2,5% | 2,5% | 0,0% |
| CUNDINAMARCA | 46.789 | 54.061 | 63.875 | 61.671 | HUILA | 2,2% | CESAR | 2,2% | HUILA | 2,3% | HUILA | 2,5% | 2,2% | 0,2% |
| GUAINÍA | 437 | 521 | 569 | 664 | CESAR | 2,2% | HUILA | 2,2% | MAGDALENA | 2,2% | MAGDALENA | 2,2% | 2,6% | -0,4% |
| GUAVIARE | 1.981 | 2.106 | 2.005 | 1.996 | QUINDÍO | 2,1% | QUINDÍO | 1,9% | CÓRDOBA | 1,7% | QUINDÍO | 1,8% | 2,1% | -0,3% |
| HUILA | 24.214 | 26.018 | 28.694 | 29.729 | CÓRDOBA | 1,9% | LA GUAJIRA | 1,7% | NARIÑO | 1,7% | CÓRDOBA | 1,8% | 1,9% | -0,1% |
| LA GUAJIRA | 13.329 | 20.101 | 20.558 | 20.764 | NARIÑO | 1,7% | CÓRDOBA | 1,7% | LA GUAJIRA | 1,7% | NARIÑO | 1,8% | 1,7% | 0,0% |
| MAGDALENA | 28.420 | 30.321 | 27.546 | 26.351 | LA GUAJIRA | 1,2% | NARIÑO | 1,6% | QUINDÍO | 1,6% | LA GUAJIRA | 1,7% | 1,2% | 0,5% |
| META | 13.266 | 13.215 | 13.926 | 13.936 | META | 1,2% | META | 1,1% | META | 1,1% | META | 1,1% | 1,2% | -0,1% |
| NARIÑO | 18.924 | 18.529 | 21.297 | 21.586 | CHOCÓ | 1,1% | CHOCÓ | 1,0% | CAQUETÁ | 1,0% | CHOCÓ | 1,1% | 1,1% | 0,0% |
| NORTE DE SANTANDER | 47.509 | 54.614 | 59.161 | 58.887 | CAQUETÁ | 0,9% | CAQUETÁ | 1,0% | CHOCÓ | 0,9% | CAQUETÁ | 1,0% | 0,9% | 0,1% |
| QUINDÍO | 22.669 | 21.605 | 20.313 | 21.974 | SUCRE | 0,7% | SUCRE | 0,7% | SUCRE | 0,7% | SUCRE | 0,8% | 0,7% | 0,1% |
| RISARALDA | 26.938 | 30.273 | 32.334 | 30.095 | CASANARE | 0,4% | CASANARE | 0,3% | CASANARE | 0,3% | CASANARE | 0,3% | 0,4% | 0,0% |
| SAN ANDRÉS Y PROVIDENCIA | 1.277 | 1.699 | 1.388 | 1.551 | GUAVIARE | 0,2% | GUAVIARE | 0,2% | GUAVIARE | 0,2% | GUAVIARE | 0,2% | 0,2% | 0,0% |
| SANTANDER | 68.337 | 69.984 | 69.446 | 66.676 | SAN ANDRÉS Y PROVIDENCIA | 0,1% | 0,1% | 0,0% |
| SUCRE | 7.453 | 8.371 | 8.677 | 10.035 | ARAUCA | 0,1% | ARAUCA | 0,1% | ARAUCA | 0,1% | ARAUCA | 0,1% | 0,1% | 0,0% |
| TOLIMA | 32.089 | 32.792 | 36.148 | 35.672 | VICHADA | 0,1% | VICHADA | 0,1% | VICHADA | 0,1% | AMAZONAS | 0,1% | 0,0% | 0,0% |
| VALLE DEL CAUCA | 80.221 | 90.389 | 97.292 | 96.690 | AMAZONAS | 0,0% | GUAINÍA | 0,0% | AMAZONAS | 0,0% | GUAINÍA | 0,1% | 0,0% | 0,0% |
| VAUPÉS | 359 | 227 | 229 | 141 | GUAINÍA | 0,0% | AMAZONAS | 0,0% | AMAZONAS | 0,0% | VICHADA | 0,0% | 0,1% | 0,0% |
| VICHADA | 711 | 699 | 789 | 508 | VAUPÉS | 0,0% | VAUPÉS | 0,0% | VAUPÉS | 0,0% | VAUPÉS | 0,0% | 0,0% | 0,0% |
| TOTAL | 1.086.638 | 1.162.961 | 1.238.121 | 1.213.196 | TOTAL | 100,0% | TOTAL | 100,0% | TOTAL | 100,0% | TOTAL | 100,0% | 100,0% | |

Source. Own elaboration based on SNIES reports.

At the same time, the information obtained in the years of study is consolidated by the department to determine their representation and classified by percentage ranges that show the position of the number of departments that compose them and are described in the results of this work.

Table 6. Representation by percentage range, number of departments

| Tabla Representación % por Departamento del Total n | | |
|--|---------|---------|
| Nivel % | Oficial | Privado |
| 0% | 8 | 8 |
| 0,1% AL 10% | 22 | 22 |
| >10% AL 33% | 1 | 1 |
| >33% AL 66% | 1 | 1 |
| >66% AL 100% | 0 | 0 |

Nota. Elaboración propia fuente: MEN - SNIES

*Phase 6: Data processing
with application of*

Kruskal-Wallis test for independent samples.

The Kruskal-Wallis test was performed for each of the variables where the null hypothesis was presented, showing asymptotic significance, where the significance level is 0.05 (Appendix 2, Kruskal-Wallis test by dimension for each variable).

Table 7. Kruskal-Wallis test by dimension in each variable

| Resumen de prueba de hipótesis | | | | |
|--------------------------------|--|---|-------|----------------------------|
| | Hipótesis nula | Prueba | Sig. | Decisión |
| 1 | La distribución de AMAZONAS es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 2 | La distribución de ANTIOQUIA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 3 | La distribución de ARAUCA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 4 | La distribución de ATLÁNTICO es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 5 | La distribución de BOGOTÁ es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 6 | La distribución de BOLÍVAR es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 7 | La distribución de BOYACÁ es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 8 | La distribución de CALDAS es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 9 | La distribución de CAQUETÁ es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 10 | La distribución de CASANARE es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 11 | La distribución de CAUCA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 12 | La distribución de CESAR es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 13 | La distribución de CHOCÓ es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 14 | La distribución de CÓRDOBA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 15 | La distribución de CUNDINAMARCA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 16 | La distribución de GUAINÍA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 17 | La distribución de GUAVIARE es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 18 | La distribución de HUILA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 19 | La distribución de LA GUAJIRA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 20 | La distribución de MAGDALENA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 21 | La distribución de META es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 22 | La distribución de NARIÑO es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 23 | La distribución de NORTE DE SANTANDER es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 24 | La distribución de QUINDÍO es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 25 | La distribución de RISARALDA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 26 | La distribución de SAN ANDRÉS Y PROVIDENCIA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 27 | La distribución de SANTANDER es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 28 | La distribución de SUCRE es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 29 | La distribución de TOLIMA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 30 | La distribución de VALLE DEL CAUCA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 31 | La distribución de VAUPÉS es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |
| 32 | La distribución de VICHADA es la misma entre las categorías de DEPARTAMENTO / MATRICULA POR NIVEL DE FORMACIÓN. | Prueba de Kruskal-Wallis para muestras independientes | 0.406 | Retener la hipótesis nula. |

Se muestran significaciones asintóticas. El nivel de significación es de ,05.

Results

The following variables that are part of the educational efficiency at the departmental level were reviewed and analyzed to show the behavior and reality of these variables, where the input variables are analyzed, such as coverage variables, enrollment, teachers and outputs in which the students are found.

Data extracted from the database of the Ministry of Education, SNIES, SPADIES, Minciencias, information obtained from 28 Colombian agencies, from Parametric Statistics, statistics determine the behavior of the variables under the study of higher education of Colombian institutions in the departments of Amazonas, Antioquia, Arauca, Atlántico, Bogotá, Bolívar, Boyacá, Caldas, Caquetá, Casanare, Cauca, Cesar, Choco, Córdoba, Cundinamarca, Guinea, Guaviare, Huila, La Guajira, Magdalena, Meta, Norte de Santander, Risaralda, San Andres y Providencia, Santander, Sucre, Tolima, Valle del Cauca, Vaupes, Vichada, and from these sections, information was collected on the following variables with the dimensions and indicators specified below.

Incoming Variables (Inputs)

The incoming Variables are composed of coverage, enrolled, and teachers, where the identification and description of each one of the Variables with their dimensions are made during the years of study and by departments; this tour generates a global and detailed look at the problems found, through the analysis of the data, where it can be evidenced that most of the departments have low access to Higher Education, a low level of enrolled and the level of training of their teachers is deficient, generating significant gaps for the economic development in the country.

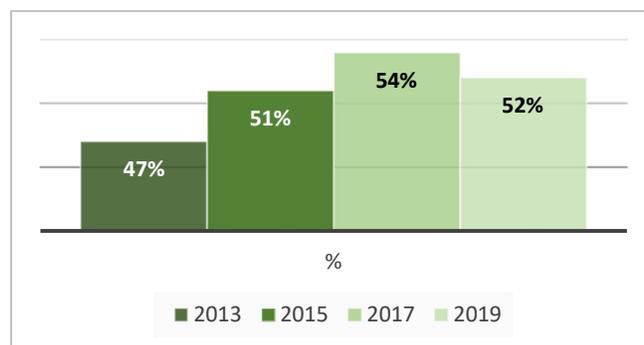
➤ Coverage rate

It shows the relationship between students enrolled at the undergraduate level (professional technical, technological and university) and the projected population between 17 and 21 years of age. Therefore, it measures the participation of young people and adults who are enrolled in a higher education training program, as mentioned in the technical data sheet of the SNIES information, where at the national level, Colombia has made progress in improving access to education and has made some improvements in internal efficiency.

Within the evidence gathered from the data analyzed, the country faces challenges such as low completion rates of lower secondary education, unequal access and achievement, and low-quality education. On average, the poorest sectors have lower education rates than the richest sectors, according to the World Bank (2007). As well as young people, the least advantaged families in Colombia face a wider range of potential difficulties in accessing higher education, compounded by the low quality of education they receive, which places them at a disadvantage.

This is reflected in the low coverage in relatively poor departments or rural areas that limit the higher education opportunities available from their residence.

Figure 1 Coverage Rate at National Level



Source. Own elaboration based on SNIES reports.

The coverage rate of higher education in Colombia is evidenced in the years of study, where a gradual increase is evidenced in the years 2013, 2015, and 2017, where this growth does not exceed

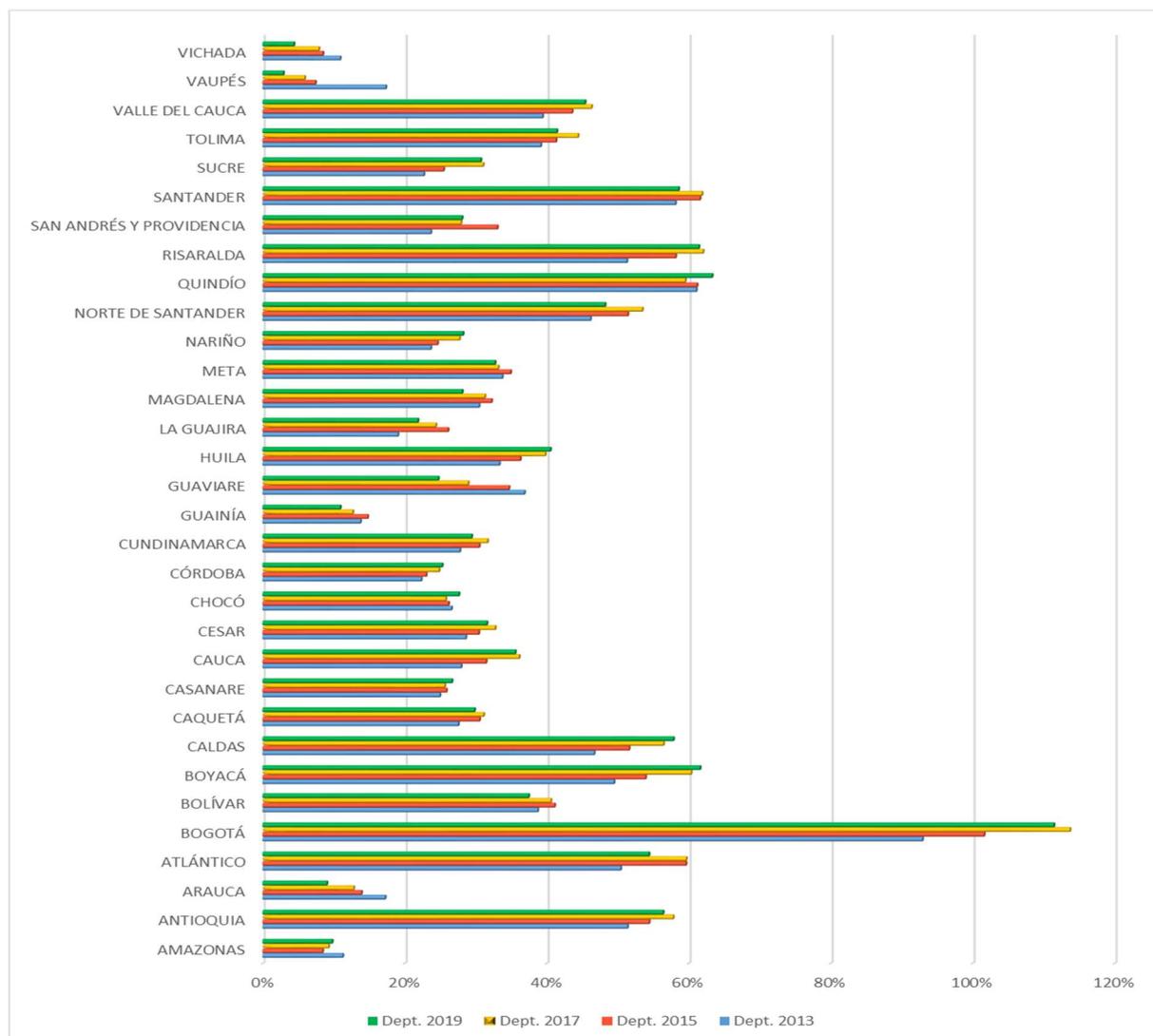
7% in 4 years, and in the year 2,019 a decrease represented by 2% is generated, so continuity and an advance in the coverage of Higher Education in Colombia are lost.

This situation becomes more acute when it is broken down at the departmental level, showing the political, economic and governmental neglect of the State in these departments where there is evidence of backwardness in their development and growth as regions rich in flora, fauna and minerals among other riches they have, this situation shows the problem of access to higher education for Colombians being a right to the person and public service that has a social function, This situation evidences the problem of access to higher education for Colombians, being a right of the person and public service that has a social function, which is that the population receives knowledge in science, technology, human rights, peace and democracy among others, for cultural improvement as stated in Article 67 of the Constitution of Colombia, where only 52% of coverage is available.

This situation reflects several consequences that can be seen in the increase in poverty, the population's vulnerability, school inequality, and barriers to access to higher education. Although there are educational policies such as Law 30 and the same Political Constitution of Colombia that regulates the normative guidelines governing education in Colombia, there are failures of educational policies that lead to social inequality, resulting in the poor receiving the worst education, i.e., absurdly the worst schools are for those who most need it, so social inequality deepens, there are failures of educational policies that lead to social inequality, resulting in the poor receiving the worst education, that is, absurdly the worst schools are for those who need them most, thus social inequality deepens school inequality, because every time one moves from one level to another, there are fewer students. They are the ones with better economic status (Gil, 2014).

Table by departments in the years 2013 to 2019 in intermediate intervals of the rate of Higher Education Coverage in the departments of Colombia.

Figure 2 Coverage rate in higher education at the departmental level



Source. Own elaboration based on SNIES reports.

Table 8. Higher Education Coverage Rate at the Departmental Level

| Department | Year 2013 | Year 2015 | Year 2,017 | Year 2,019 |
|------------|-----------|-----------|------------|------------|
| Amazon | 11% | 8% | 9% | 10% |
| Antioquia | 51% | 54% | 58% | 56% |
| Arauca | 17% | 14% | 13% | 9% |
| Atlantic | 50% | 60% | 60% | 54% |
| Bogotá | 93% | 102% | 114% | 111% |
| Bolivar | 39% | 41% | 41% | 37% |
| Boyaca | 49% | 54% | 60% | 62% |
| Caldas | 47% | 52% | 56% | 58% |

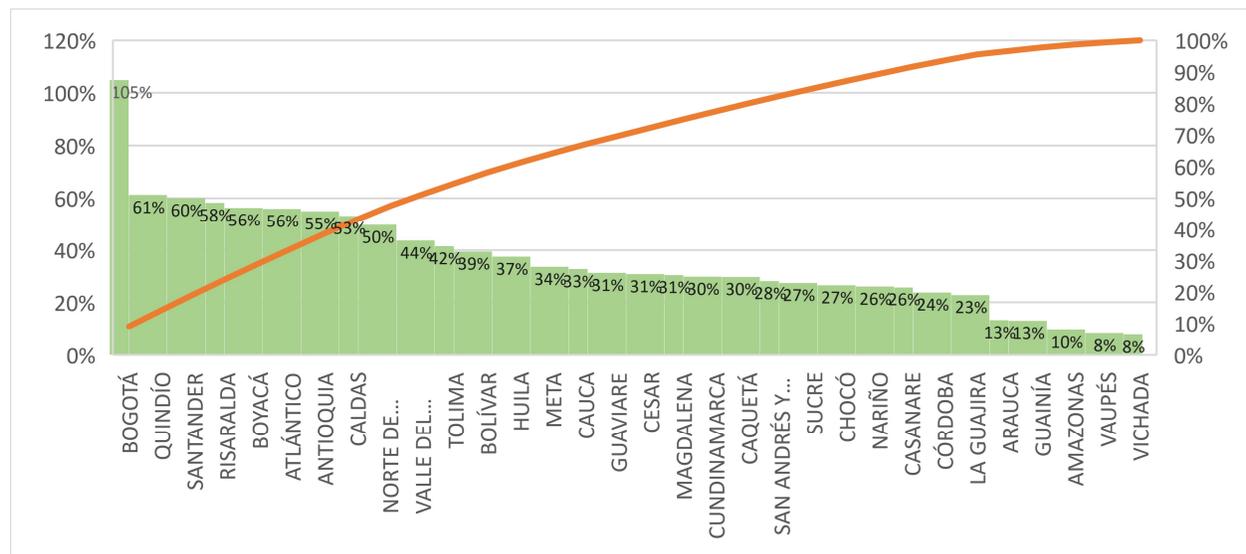
| | | | | |
|----------------------------|-----|-----|-----|-----|
| Caquetá | 28% | 31% | 31% | 30% |
| Casanare | 25% | 26% | 26% | 27% |
| Cauca | 28% | 31% | 36% | 36% |
| Cesar | 29% | 30% | 33% | 32% |
| Chocó | 27% | 26% | 26% | 28% |
| Córdoba | 22% | 23% | 25% | 25% |
| Cundinamarca | 28% | 31% | 32% | 29% |
| Guainía | 14% | 15% | 13% | 11% |
| Guaviare | 37% | 35% | 29% | 25% |
| Huila | 33% | 36% | 40% | 41% |
| La guajira | 19% | 26% | 24% | 22% |
| Magdalena | 30% | 32% | 31% | 28% |
| Goal | 34% | 35% | 33% | 33% |
| Nariño | 24% | 25% | 28% | 28% |
| Norte de Santander | 46% | 51% | 53% | 48% |
| Quindío | 61% | 61% | 60% | 63% |
| Risaralda | 51% | 58% | 62% | 61% |
| San Andres and Providencia | 24% | 33% | 28% | 28% |
| Santander | 58% | 62% | 62% | 59% |
| Sucre | 23% | 25% | 31% | 31% |
| Tolima | 39% | 41% | 44% | 41% |
| Valle del cauca | 39% | 44% | 46% | 45% |
| Vaupés | 17% | 7% | 6% | 3% |
| Vichada | 11% | 8% | 8% | 4% |

Source: Own elaboration based on MEN - SNIES

Description: Departmental comparison of the coverage rate

The behavior of the departments for the coverage rate of education in Colombia, so it is necessary to identify the position of these departments and the significant variations, so all the data of the years of study are taken, and the average is made to determine their representation for better identification of how they are positioned compared to other departments.

Figure 3 Total percentage representation of the coverage rate by departments



Source: Own elaboration based on SNIES reports.

Bogota is in the first place, with a coverage rate of 105%, showing a constant increase in the years of study with a representation of 19% in 2009 compared to 2013; the department of Quindio, although in second place, showed decreasing variations, especially in 2017 when it decreased by 1% compared to 2015.015, the departments that represented a significant increase in their coverage rate taking as a reference the initial year and the final year were: Boyacá with 12%, followed by Caldas with 11%, Risaralda 10% and likewise there were decreases as occurred in the departments of Vaupés with the highest representation being 14%, Guaviare 12%, Arauca 8%, Vichada 7%, Guainía 3%, Magdalena 2%, Bolívar and Meta 1% so it can evidence the gaps that have been generated in Higher Education in which are evidenced in the following table that is made in the ranges that the results are given.

Table 9 Distribution by Department of Coverage Rate, Percentage Representation

| Level % Level | Departments |
|---------------|-------------|
| 0% | 0 |
| 1% TO 10%. | 3 |
| >10% TO 33 | 15 |
| >33% TO 66 | 13 |
| >66% TO 100%. | 1 |

Own elaboration source: MEN - SNIES

It is evident the representation that the departments have and the level to which they belong, where the department with the highest coverage as mentioned above is Bogota, the description of the ranges the departments involved are described from higher coverage to lower, in the range of 33%

to 66% is represented by 14 departments composed of Quindio, Santander, Risaralda, Boyacá, Atlántico, Antioquia, Caldas, Norte de Santander, Valle del Cauca, Tolima, Bolívar, Huila, Meta and Cauca. However, the highest concentration is in the range of 10% to 33%, composed of 14 departments comprising Guaviare, Cesar, Magdalena, Cundinamarca, Caquetá, San Andrés, Sucre, Choco, Nariño, Casanare, Córdoba, La Guajira, Arauca and Guainía, the departments that are in a critical state between 1% and 10% are Amazonas, Vaupés and Vichada, a situation that prevails over time as evidenced in the years analyzed. This situation shows concern regarding accessibility to Higher Education training since education is one of the indicators of development and social progress in a country, being fundamental for achieving social equity and is a key element within the paradigm of sustainable human development.

Enrollment by sector

The final objective of the enrollment process is to enroll both old and new students in the educational system since this allows the expansion of educational coverage as a response to the population's need for education, as mentioned by the MEN, which is why the meaning of this variable is taken up again, being the set of people who are formally enrolled in some educational program in a given school period. First-time enrollment ends up determined by several categories of people according to the moment of the process in which they are: the first is the prospective students, then those interested, those admitted, those who paid and those enrolled, Ramírez-Rivera, P. M. (2013), so that according to data taken from the SNIES, it can be evidenced the amounts of enrollments by sector, during the years of study.

Table 10 Enrollment by Official and Private Sector

| Department | Official 2013 | Official 2015 | Official 2017 | Official 2019 | Private 2013 | Private 2015 | Private 2017 | Private 2019 |
|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Amazon | 512 | 430 | 618 | 768 | 221 | 172 | 131 | 88 |
| Antioquia | 180,477 | 187,362 | 196,946 | 193,078 | 113,988 | 128,049 | 137,670 | 138,704 |
| Arauca | 1,163 | 1,043 | 1,170 | 1,052 | 2,316 | 1,827 | 1,694 | 1,390 |
| Atlantic | 47,247 | 55,039 | 57,869 | 53,438 | 63,643 | 75,414 | 78,427 | 80,125 |
| Bogotá | 217,302 | 228,258 | 242,640 | 229,129 | 436,578 | 506,055 | 557,749 | 542,184 |
| Bolivar | 35,807 | 37,456 | 39,268 | 39,024 | 36,927 | 39,627 | 38,703 | 36,391 |

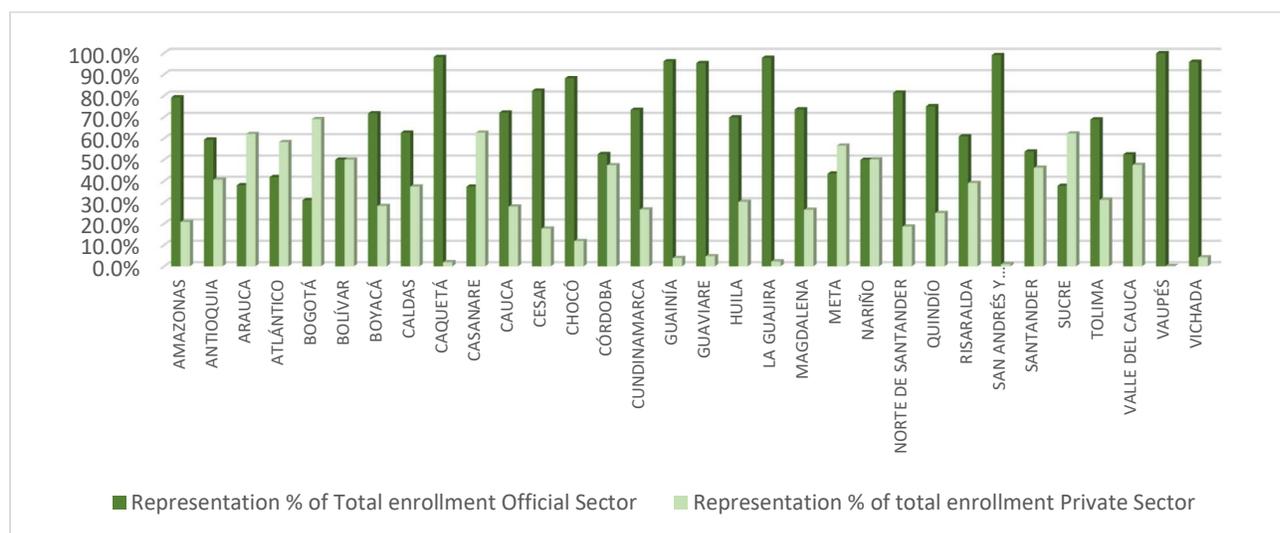
| | | | | | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Boyaca | 43,304 | 45,011 | 48,635 | 48,583 | 17,701 | 17,296 | 20,778 | 17,429 |
| Caldas | 28,303 | 29,753 | 30,277 | 30,468 | 14,085 | 16,838 | 19,880 | 20,112 |
| Caquetá | 9,835 | 11,271 | 12,099 | 12,068 | 337 | 276 | 146 | 114 |
| Casanare | 3,814 | 3,345 | 3,409 | 4,149 | 5,026 | 6,402 | 6,680 | 6,576 |
| Cauca | 27,625 | 31,042 | 37,132 | 36,314 | 9,977 | 12,428 | 13,993 | 14,874 |
| Cesar | 24,100 | 26,125 | 30,823 | 31,751 | 5,474 | 5,957 | 6,482 | 6,315 |
| Chocó | 11,831 | 11,881 | 11,680 | 12,844 | 1,272 | 1,446 | 1,959 | 1,801 |
| Córdoba | 20,395 | 19,420 | 21,308 | 21,604 | 16,524 | 18,799 | 19,764 | 19,392 |
| Cundinamarca | 46,789 | 54,061 | 63,875 | 61,671 | 19,161 | 22,973 | 19,735 | 20,352 |
| Guainía | 437 | 521 | 569 | 664 | 6 | 41 | 36 | 6 |
| Guaviare | 1,981 | 2,106 | 2,005 | 1,996 | 60 | 83 | 133 | 125 |
| Huila | 24,214 | 26,018 | 28,694 | 29,729 | 10,995 | 12,014 | 12,318 | 11,731 |
| La guajira | 13,329 | 20,101 | 20,558 | 20,764 | 455 | 180 | 512 | 599 |
| Magdalena | 28,420 | 30,321 | 27,546 | 26,351 | 8,641 | 9,150 | 11,799 | 10,935 |
| Goal | 13,266 | 13,215 | 13,926 | 13,936 | 16,840 | 18,973 | 17,430 | 17,516 |
| Nariño | 18,924 | 18,529 | 21,297 | 21,586 | 18,111 | 19,902 | 21,918 | 20,739 |
| Norte de Santander | 47,509 | 54,614 | 59,161 | 58,887 | 13,212 | 12,971 | 13,204 | 10,935 |
| Quindío | 22,669 | 21,605 | 20,313 | 21,974 | 7,065 | 8,115 | 6,875 | 6,780 |
| Risaralda | 26,938 | 30,273 | 32,334 | 30,095 | 17,512 | 19,708 | 19,435 | 20,063 |

| | | | | | | | | |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| San Andres and Providencia | 1,277 | 1,699 | 1,388 | 1,551 | 24 | 12 | - | 24 |
| Santander | 68,337 | 69,984 | 69,446 | 66,676 | 60,441 | 59,539 | 58,483 | 57,202 |
| Sucre | 7,453 | 8,371 | 8,677 | 10,035 | 11,883 | 12,277 | 16,691 | 16,178 |
| Tolima | 32,089 | 32,792 | 36,148 | 35,672 | 15,609 | 15,910 | 15,905 | 14,464 |
| Valle del cauca | 80,221 | 90,389 | 97,292 | 96,690 | 78,205 | 82,382 | 85,280 | 84,420 |
| Vaupés | 359 | 227 | 229 | 141 | - | 1 | - | - |
| Vichada | 711 | 699 | 789 | 508 | 56 | 35 | 12 | 15 |

Source: Own elaboration source: MEN - SNIES

Consolidated by year and by total enrollment by the official and private sector in order to determine the percentage that each sector represents and thus be able to understand the data represented in the table.

Figure 4 Detail of Enrollments by Sector, by Year and their Total Representation



Source: Own elaboration based on MEN - SNIES reports.

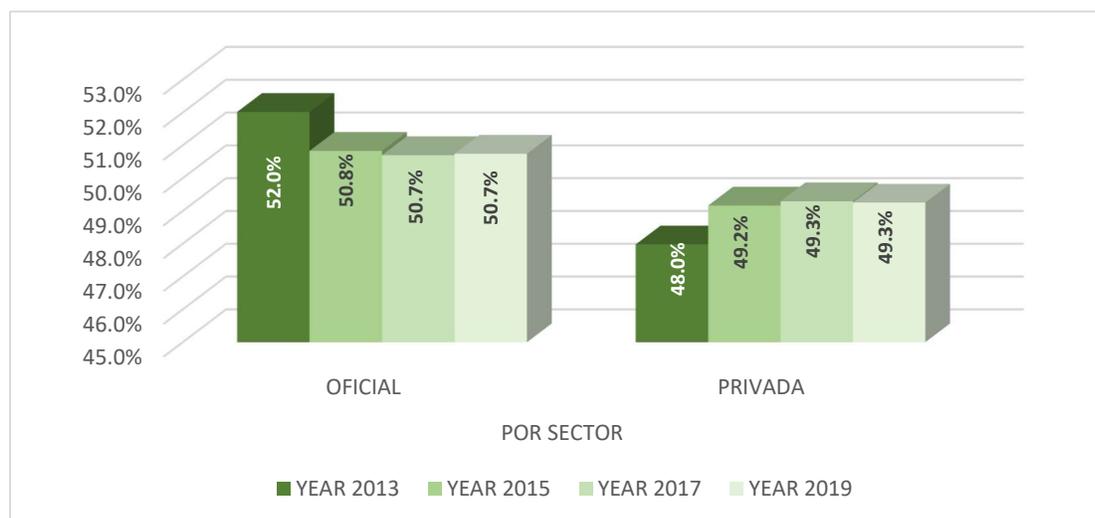
Table 11 Detail of Enrollments by Sector, by Year and Total Representation

| Year | Officer | Private | Total |
|----------------|-----------|-----------|-----------|
| Year 2013 | 1,086,638 | 1,002,345 | 2,088,983 |
| Year 2015 | 1,162,961 | 1,124,852 | 2,287,813 |
| Year 2017 | 1,238,121 | 1,203,822 | 2,441,943 |
| Year 2019 | 1,213,196 | 1,177,579 | 2,390,775 |
| Total | 4,700,916 | 4,508,598 | 9,209,514 |
| Representation | 51% | 49% | 100% |

Source: Own elaboration source: MEN - SNIES

It is evident that there is no representative difference between the two sectors, with the official sector leading with 51% of the total enrollment in the years of study, and has presented, as well as the private sector, an increase in enrollment in the years from 2013 to 2017, representing 3.2% in both sectors, and in the year 2019, their enrollment decreased by 0.5%.

Figure 5 Percentage representation of enrollment by sector and year



Source: Own elaboration based on MEN - SNIES reports.

The representation of enrollments by year shows that the official sector in 2013 showed its highest representative percentage, decreasing progressively in the following years and 2019 without representative variation, contrary to the private sector, whose variation was higher from one year to another except for 2019, which remained without representative variation.

A comparison of the total enrollment for the years under study is made to identify the representation of each sector in the departments and to understand better the data, which is why the compendium is made.

Table 12 Total Enrollment Representation by Sector and its Percentage Representation

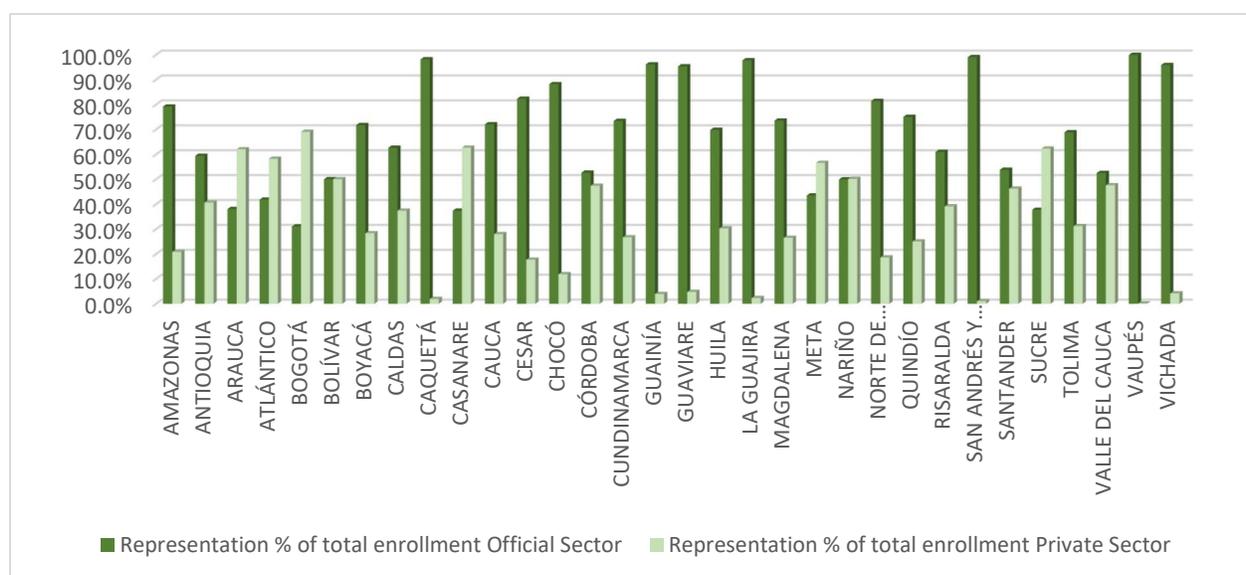
| Department | Officer | Private | Total Enrollment | Representation % of total enrollment Official Sector | Representation % of total enrollment Private Sector |
|-------------------------------|---------|-----------|------------------|---|--|
| Amazon | 2,328 | 612 | 2,940 | 79.2% | 20.8% |
| Antioquia | 757,863 | 518,411 | 1,276,274 | 59.4% | 40.6% |
| Arauca | 4,428 | 7,227 | 11,655 | 38.0% | 62.0% |
| Atlantic | 213,593 | 297,609 | 511,202 | 41.8% | 58.2% |
| Bogotá | 917,329 | 2,042,566 | 2,959,895 | 31.0% | 69.0% |
| Bolívar | 151,555 | 151,648 | 303,203 | 50.0% | 50.0% |
| Boyaca | 185,533 | 73,204 | 258,737 | 71.7% | 28.3% |
| Caldas | 118,801 | 70,915 | 189,716 | 62.6% | 37.4% |
| Caquetá | 45,273 | 873 | 46,146 | 98.1% | 1.9% |
| Casanare | 14,717 | 24,684 | 39,401 | 37.4% | 62.6% |
| Cauca | 132,113 | 51,272 | 183,385 | 72.0% | 28.0% |
| Cesar | 112,799 | 24,228 | 137,027 | 82.3% | 17.7% |
| Chocó | 48,236 | 6,478 | 54,714 | 88.2% | 11.8% |
| Córdoba | 82,727 | 74,479 | 157,206 | 52.6% | 47.4% |
| Cundinamarca | 226,396 | 82,221 | 308,617 | 73.4% | 26.6% |
| Guainía | 2,191 | | 2,280 | 96.1% | 3.9% |
| Guaviare | 8,088 | 401 | 8,489 | 95.3% | 4.7% |
| Huila | 108,655 | 47,058 | 155,713 | 69.8% | 30.2% |
| La guajira | 74,752 | 1,746 | 76,498 | 97.7% | 2.3% |
| Magdalena | 112,638 | 40,525 | 153,163 | 73.5% | 26.5% |
| Goal | 54,343 | 70,759 | 125,102 | 43.4% | 56.6% |
| Nariño | 80,336 | 80,670 | 161,006 | 49.9% | 50.1% |
| Norte de Santander | 220,171 | 50,322 | 270,493 | 81.4% | 18.6% |
| Quindío | 86,561 | 28,835 | 115,396 | 75.0% | 25.0% |
| Risaralda | 119,640 | 76,718 | 196,358 | 60.9% | 39.1% |
| San Andres and Providencia | 5,915 | | 5,975 | 99.0% | 1.0% |
| Santander | 274,443 | 235,665 | 510,108 | 53.8% | 46.2% |
| Sucre | 34,536 | 57,029 | 91,565 | 37.7% | 62.3% |
| Tolima | 136,701 | 61,888 | 198,589 | 68.8% | 31.2% |
| Valle del cauca | 364,592 | 330,287 | 694,879 | 52.5% | 47.5% |
| Vaupés | 956 | 1 | 957 | 99.9% | 0.1% |
| Vichada | 2,707 | | 2,825 | 95.8% | 4.2% |

Source: Own elaboration source: MEN - SNIES

Departments such as Bogota lead in enrollment representation in the private sector, and the department of Atlántico, ranks fourth in enrollment representation, with 16% more enrollment in the private sector than in the public sector. The departments with low enrollments belong to the official sector.

The representation of the total enrollment in each department with the classification between the Official and Private sectors is shown in the following figure.

Figure 6 Total enrollment representation by sector and by department



Source: Own elaboration based on MEN - SNIES reports.

Classification of the data from Table 6, the percentage representation of the total enrollments by the department and represented in Table 7.

Table 13 Representation % by Department of Total Enrollments by Sector

| Level % Level | Officer | Private |
|---------------|---------|---------|
| 0% | 0 | 0 |
| 0.1% TO 10%. | 0 | 7 |
| >10% TO 33 | 1 | 11 |
| >33% TO 66 | 13 | 13 |
| >66% TO 100%. | 18 | 1 |

Source: Own elaboration MEN - SNIES

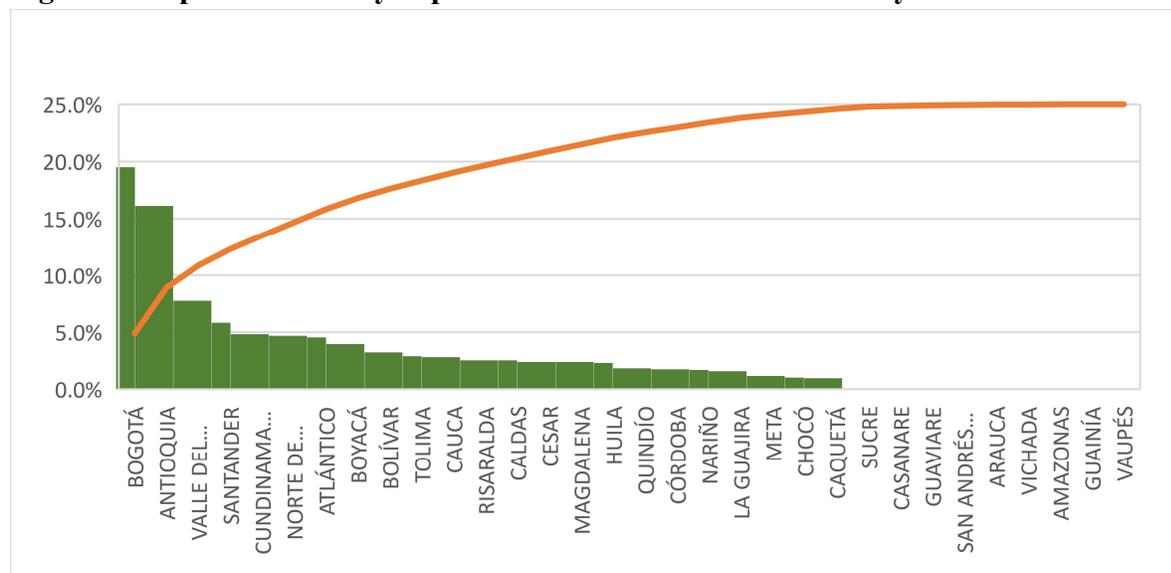
Departments such as Bogotá, which leads in enrollment representation in the private sector, and the department of Atlántico, which occupies fourth place in enrollment representation, has 16% more enrollments in the private sector than in the official sector. On the other hand, the departments with low enrollments belong to the official sector, as mentioned above.

Table 14 Distribution by Department of Enrollments by Official Sector

| Level % Level | Departments |
|---------------|-------------|
| 0% | 3 |
| 0.1% TO 10%. | 27 |
| >10% TO 33 | 2 |
| >33% TO 66 | 0 |
| >66% TO 100%. | 0 |

Own elaboration source: MEN - SNIES

Figure 7: Representation by department of the total enrollment by official sector.

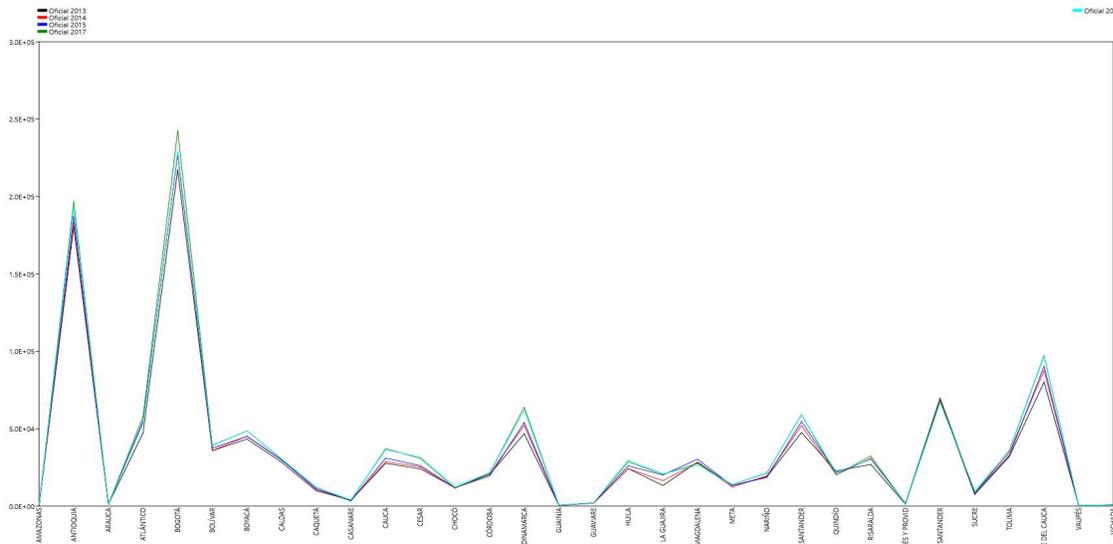


Source. Own elaboration based on MEN - SNIES reports.

The description of the faculties that make up the entry to formal disciplines is taken from the total number of teachers over the academic years and their representation is described from highest to lowest representation, within 10%. At 33% we see that Bogota leads the enrollment rate with 19.5%, in the range of Antioquia 16.1%, between 0.1% and 10%, made up of 27 departments, of which Valle del Cauca is 7.8%, Santander 5.8%, Cundinamarca 4,8 % Norte de Santander 4.7 %

Atlántico 4.5 % Boyacá 3.9 % Bolívar 3.2 % Tolima 2.9 % Cauca 2.8 % Risaralda and Caldas 2.5 % César and Magdalena 2.4 %, Huila 2.3 % Quindío 1.8 %, Córdoba 1.8 %, Nariño 1.7 %, La Guajira 1.6%, Meta 1.2%, Chocó and Caquetá 1%, Other divisions 0.1 to 0.9%, Sucre, Casanare, Guaviare, San Andrés, Arauca Vichada, Other divisions 8 of them in the range 0%, I put together a couple of Amazonas, Guainía and Vaupés.

Figure 8 Enrollment by Official Sector



Source. Elaborated using the Kruskal-Wallis test result.

The Kruskal-Wallis test is performed for independent samples, where the hypothesis is null and is retained where it is identified that each department in the years of study did not present a significant variation while maintaining its average, with the department of Bogotá presenting the largest number of enrollments in the official sector representing 19.5% and presenting a decrease in enrollments in the year 2. The department of Antioquia occupies the second place with a representation of 16.1%, who, like Bogotá, decreased its enrollments compared to the initial year of the research represented by 0.7% Valle del Cauca is positioned in the third place with 7.8% of representation where there were variations of increase in their enrollments by 0.6% between the years 2013 and 2019.

The departments that presented significant variations in their enrollment decreases compared to 2013 were Santander with 0.8%, Magdalena with 0.4% and Quindío with 0.3%, the others presented null or non-representative differences. There were also significant variations in the departments of Cundinamarca with 0.8%, Valle del Cauca with 0.6%, Norte de Santander, Cauca and La Guajira with 0.5% and Cesar with 0.4%. 0.13 the enrollment in the official sector represented

23.1%, in 2015 24.7%, in 2017 26.3% and in 2019 25.8%, where until 2017 the increase was progressive, but in 2019 it decreased by 0.5% compared to the previous year.

Enrollments by Training Level

Higher education in Colombia is composed of undergraduate academic levels, which correspond, as described by the Ministry of Education in the definitions related to higher education in Colombia, to academic programs that prepare for the performance of occupations, for the exercise of a specific profession or discipline, of a technological or scientific nature or in the area of humanities, arts and philosophy. Postgraduate academic programs are academic programs at the last level of formal higher education that contribute to strengthen the bases for the generation, transfer, appropriation and application of knowledge, as well as to maintain in force the disciplinary and professional knowledge imparted in undergraduate programs. The postgraduate level includes specializations, master's degrees and doctorates.

Table 15 Detail of Enrollment by Level of Formation Part 1

| Departamento | Tec. Prof. 2013 | Tec. Prof. 2015 | Tec. Prof. 2017 | Tec. Prof. 2019 | Tecnol. 2013 | Tecnol. 2015 | Tecnol. 2017 | Tecnol. 2019 | Prog. 2013 | Prog. 2015 | Prog. 2017 | Prog. 2019 |
|--------------------------|--------------------|--------------------|--------------------|--------------------|--------------|--------------|--------------|--------------|------------|------------|------------|------------|
| Amazonas | 82 | 40 | 7 | 5 | 292 | 272 | 318 | 412 | 329 | 237 | 315 | 319 |
| Antioquia | 4,269 | 4,355 | 2,977 | 3,678 | 111,224 | 110,782 | 113,575 | 102,439 | 164,092 | 182,990 | 199,259 | 201,623 |
| Arauca | 7 | 1 | - | - | 1,148 | 898 | 1,024 | 728 | 2,239 | 1,952 | 1,815 | 1,666 |
| Atlántico | 6,438 | 9,417 | 7,185 | 7,786 | 26,231 | 33,669 | 36,048 | 28,314 | 73,300 | 82,498 | 85,250 | 89,387 |
| Bogotá | 39,971 | 39,403 | 31,459 | 33,981 | 150,728 | 162,508 | 179,321 | 146,778 | 413,636 | 465,501 | 519,284 | 512,491 |
| Bolívar | 1,982 | 3,310 | 2,171 | 1,617 | 30,590 | 31,582 | 31,406 | 27,829 | 38,008 | 39,872 | 41,072 | 42,595 |
| Bovacá | 671 | 605 | 2,021 | 1,464 | 14,276 | 13,838 | 14,109 | 14,463 | 38,989 | 42,912 | 45,681 | 44,915 |
| Caldas | 918 | 2,298 | 2,185 | 3,694 | 12,265 | 10,999 | 10,729 | 9,069 | 25,395 | 28,430 | 31,550 | 31,779 |
| Caquetá | 171 | 248 | 63 | 87 | 1,493 | 1,668 | 1,530 | 1,483 | 8,152 | 9,154 | 9,913 | 9,851 |
| Casanare | 167 | 352 | 704 | 927 | 2,169 | 1,868 | 1,811 | 1,951 | 6,386 | 7,232 | 7,190 | 7,571 |
| Cauca | 65 | 452 | 34 | 119 | 11,470 | 12,461 | 15,519 | 13,902 | 24,982 | 29,095 | 33,344 | 34,297 |
| Cesar | 174 | 117 | 22 | 16 | 7,580 | 8,967 | 9,570 | 10,186 | 21,652 | 22,802 | 25,752 | 26,272 |
| Chocó | 151 | 2 | - | 107 | 1,234 | 867 | 943 | 886 | 11,548 | 12,059 | 12,056 | 13,278 |
| Córdoba | 1,450 | 2,003 | 1,115 | 1,133 | 6,023 | 3,806 | 4,409 | 3,040 | 28,824 | 31,299 | 33,915 | 35,544 |
| Cundinamarca | 1,215 | 671 | 1,317 | 2,020 | 29,408 | 33,553 | 36,001 | 33,952 | 32,971 | 38,910 | 41,974 | 41,183 |
| Guainía | 2 | 41 | 7 | 6 | 221 | 343 | 376 | 470 | 204 | 168 | 193 | 123 |
| Guaviare | - | - | - | 2 | 1,518 | 1,732 | 1,534 | 1,462 | 502 | 445 | 564 | 596 |
| Huila | 717 | 1,101 | 630 | 709 | 10,158 | 11,433 | 13,104 | 12,471 | 23,338 | 24,301 | 25,833 | 26,214 |
| La guajira | 1,012 | 684 | 534 | 720 | 3,652 | 5,242 | 5,626 | 5,225 | 8,995 | 14,268 | 14,441 | 14,756 |
| Magdalena | 3,459 | 3,958 | 2,557 | 3,043 | 7,706 | 7,022 | 8,942 | 6,478 | 25,149 | 27,563 | 26,464 | 26,227 |
| Meta | 762 | 1,149 | 725 | 1,010 | 5,387 | 6,106 | 5,954 | 5,342 | 23,023 | 23,978 | 23,724 | 23,998 |
| Nariño | 513 | 989 | 516 | 796 | 7,126 | 6,138 | 6,100 | 4,910 | 28,128 | 30,044 | 34,292 | 34,376 |
| Norte de Santander | 1,124 | 1,125 | 1,213 | 955 | 12,486 | 13,556 | 13,362 | 12,786 | 45,342 | 51,235 | 54,909 | 52,979 |
| Quindío | 1,242 | 1,455 | 1,014 | 531 | 7,592 | 9,157 | 10,045 | 9,299 | 20,394 | 18,020 | 15,700 | 17,262 |
| Risaralda | 1,325 | 1,792 | 1,359 | 1,846 | 11,723 | 12,966 | 14,151 | 12,208 | 28,865 | 31,808 | 32,624 | 31,796 |
| San Andrés y providencia | 194 | 410 | 65 | 109 | 1,011 | 1,234 | 1,210 | 1,139 | 69 | 39 | 68 | 49 |
| Santander | 1,702 | 3,387 | 1,587 | 1,206 | 45,152 | 46,485 | 43,584 | 38,459 | 63,401 | 65,996 | 69,442 | 68,193 |
| Sucre | 1,490 | 2,196 | 1,463 | 1,849 | 1,587 | 2,137 | 3,172 | 2,736 | 15,203 | 15,998 | 20,362 | 21,250 |
| Tolima | 3,760 | 3,929 | 3,183 | 3,479 | 14,703 | 15,067 | 18,158 | 16,606 | 27,623 | 28,685 | 29,121 | 26,667 |
| Valle del cauca | 7,843 | 8,249 | 7,140 | 8,894 | 48,327 | 52,188 | 53,209 | 45,337 | 94,064 | 103,148 | 111,030 | 113,193 |
| Vaupés | - | - | - | - | 344 | 192 | 168 | 105 | 15 | 1 | 39 | 36 |
| Vichada | 21 | 12 | - | - | 581 | 579 | 672 | 396 | 154 | 114 | 114 | 120 |

Table 16 Detail of Enrollment by Level of Formation Part 2

| DEPARTAMENTO | Especi. 2013 | Especi. 2015 | Especi. 2017 | Especi. 2019 | Maest. 2013 | Maest. 2015 | Maest. 2017 | Maest. 2019 | Doct. 2013 | Doct. 2015 | Doct. 2017 | Doct. 2019 |
|--------------------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|
| Amazonas | 10 | 17 | 50 | 72 | 17 | 28 | 45 | 35 | 3 | 8 | 14 | 13 |
| Antioquia | 9,051 | 9,497 | 9,958 | 15,710 | 4,862 | 6,472 | 7,295 | 6,826 | 967 | 1,315 | 1,552 | 1,506 |
| Arauca | 85 | 19 | 25 | 48 | - | - | - | - | - | - | - | - |
| Atlántico | 3,333 | 2,679 | 4,389 | 5,206 | 1,534 | 2,076 | 3,135 | 2,472 | 54 | 114 | 289 | 398 |
| Bogotá | 30,151 | 41,576 | 42,123 | 49,294 | 17,636 | 23,115 | 25,916 | 26,471 | 1,758 | 2,210 | 2,286 | 2,298 |
| Bolívar | 1,740 | 1,671 | 1,962 | 2,159 | 359 | 580 | 1,261 | 1,107 | 55 | 68 | 99 | 108 |
| Boyacá | 5,883 | 3,500 | 6,027 | 3,249 | 1,090 | 1,341 | 1,444 | 1,741 | 96 | 111 | 131 | 180 |
| Caldas | 1,055 | 1,575 | 1,758 | 2,684 | 2,601 | 2,915 | 3,497 | 2,867 | 154 | 374 | 438 | 487 |
| Caquetá | 232 | 244 | 347 | 455 | 124 | 217 | 382 | 279 | - | 16 | 10 | 27 |
| Casanare | 91 | 241 | 371 | 246 | 27 | 54 | 13 | 30 | - | - | - | - |
| Cauca | 705 | 777 | 955 | 1,839 | 301 | 588 | 1,142 | 893 | 79 | 97 | 131 | 138 |
| Cesar | 165 | 169 | 1,868 | 1,316 | 3 | 27 | 93 | 276 | - | - | - | - |
| Chocó | 114 | 237 | 248 | 313 | 56 | 162 | 392 | 61 | - | - | - | - |
| Córdoba | 560 | 930 | 1,131 | 1,033 | 62 | 181 | 500 | 240 | - | - | 2 | 6 |
| Cundinamarca | 1,649 | 2,018 | 2,311 | 3,454 | 687 | 1,849 | 1,945 | 1,322 | 20 | 33 | 62 | 92 |
| Guainía | 13 | 8 | 20 | 69 | 3 | 2 | 9 | 2 | - | - | - | - |
| Guaviare | 21 | 12 | 39 | 60 | - | - | 1 | 1 | - | - | - | - |
| Huila | 892 | 768 | 804 | 1,159 | 104 | 422 | 618 | 880 | - | 7 | 23 | 27 |
| La guajira | 80 | 54 | 181 | 205 | 45 | 33 | 287 | 456 | - | - | 1 | 1 |
| Magdalena | 672 | 706 | 1,061 | 1,164 | 74 | 201 | 289 | 333 | 1 | 21 | 32 | 41 |
| Meta | 844 | 778 | 655 | 877 | 90 | 177 | 298 | 217 | - | - | - | 8 |
| Nariño | 799 | 682 | 1,277 | 1,200 | 435 | 542 | 995 | 993 | 34 | 36 | 35 | 50 8 |
| Norte de Santander | 1,240 | 1,155 | 1,633 | 2,029 | 529 | 514 | 1,248 | 1,065 | - | - | - | - |
| Quindío | 386 | 799 | 221 | 1,279 | 105 | 273 | 199 | 340 | 15 | 16 | 9 | 43 |
| Risaralda | 1,482 | 1,970 | 1,632 | 2,429 | 1,012 | 1,378 | 1,879 | 1,710 | 43 | 67 | 124 | 169 |
| San Andrés y providencia | - | - | - | 244 | 23 | 16 | 34 | 21 | 4 | 12 | 11 | 13 |
| Santander | 15,407 | 8,967 | 5,075 | 7,715 | 3,028 | 4,565 | 8,098 | 8,136 | 88 | 123 | 143 | 169 |
| Sucre | 997 | 279 | 268 | 266 | 59 | 38 | 103 | 112 | - | - | - | - |
| Tolima | 1,170 | 779 | 995 | 2,871 | 432 | 236 | 570 | 459 | 10 | 6 | 26 | 54 |
| Valle del cauca | 3,584 | 4,059 | 4,951 | 8,085 | 4,189 | 4,603 | 5,589 | 4,865 | 419 | 524 | 653 | 736 |
| Vaupés | - | 35 | 22 | - | - | - | - | - | - | - | - | - |
| Vichada | 11 | 29 | 15 | 7 | - | - | - | - | - | - | - | - |

Source. Own elaboration based on MEN - SNIES reports.

Based on the information in Table 16 and 17, a consolidation is made by year and by total enrollment by level of education, professional technician, technologist, undergraduate, specialization, master's degree, doctorate, in order to determine the percentage that each sector represents and thus be able to understand the data represented in the table.

Table 17 Detail of Enrollments by Level of Formation, by Year and its Total Representation

| YEAR | Tec. | Technologist | Undergraduate | Specialization | Master's | |
|----------------|--------------|--------------|---------------|----------------|----------|--------|
| | Professional | | | | Degree | PhD |
| Year 2013 | 82,897 | 585,405 | 1,294,972 | 82,422 | 39,487 | 3,800 |
| Year 2015 | 93,751 | 619,315 | 1,430,754 | 86,230 | 52,605 | 5,158 |
| Year 2017 | 73,253 | 655,680 | 1,547,290 | 92,372 | 67,277 | 6,071 |
| Year 2019 | 81,789 | 570,861 | 1,550,606 | 116,737 | 64,210 | 6,572 |
| TOTAL | 331,690 | 2,431,261 | 5,823,622 | 377,761 | 223,579 | 21,601 |
| Representation | 3.6% | 26.4% | 63.2% | 4.1% | 2.4% | 0.2% |

Source: Own elaboration source: MEN - SNIES

The table shows the number of enrollments per year and per level of training and also shows the representation of the level of training compared to the total enrollments, with the undergraduate level representing the highest percentage of enrollments, followed by the technological level represented by 26.4%, specialization 4.1%, professional technical 3.6%, master's 2.4% and Doctorate 0.2%. When the behavior of enrollments is analyzed, it is evident that the level of training that has presented the greatest variation in enrollments comparing the initial year with the final year is the doctorate, which represented an increase of 12.8%, master's 11.1%, Specialization 9.1%, followed by an undergraduate with 4.4%. In comparison, the Technologist level decreased by 0.6% and Tec. Professional by 0.3%.

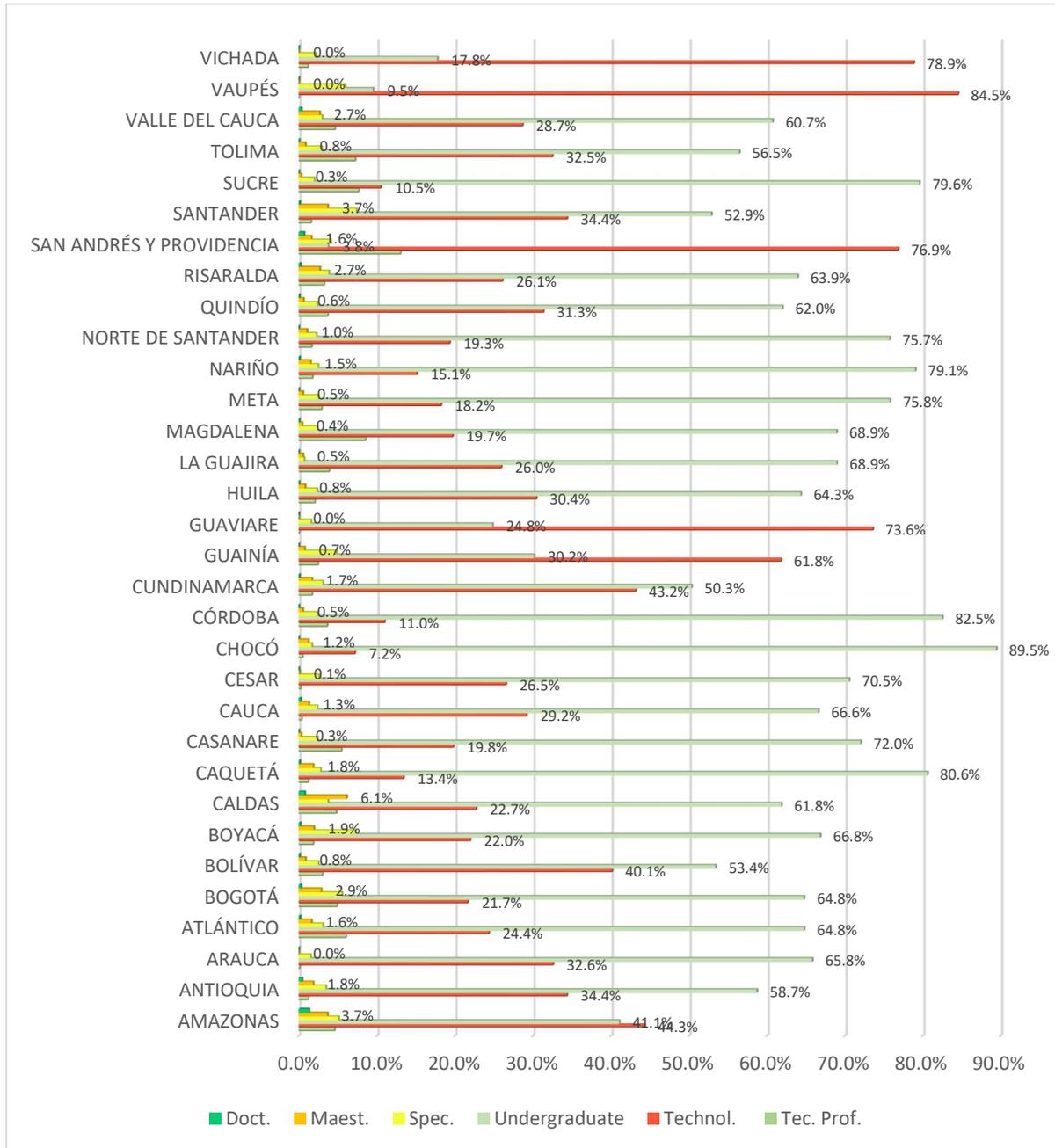
Figure 9 Percentage representation of enrollments by academic level and by year



Source: Own elaboration source: MEN - SNIES

Graph 8 shows the variations by academic level, where the levels of training that maintained the constant growth were the doctorate, specialization and undergraduate, the master’s degree presented a decrease of 1.4% in 2009 compared to 2017, and the technologist level decreased by 3.5%.

Figure 10 Representation of total enrollment by educational level



Source: Own elaboration source: MEN - SNIES

Classification of the data where the representation of the enrollments in the departments and the fluctuations that they present during the years analyzed are analyzed by level of education.

Conclusions

In the analysis of the incoming variables, it can be concluded that the variable of coverage rate in higher education at the departmental level during the years of study and its percentage

representation in each department involved, the department with the highest coverage rate is the district of Bogotá, being the only one that is part of the range of 66% to 100%, followed by departments in the 33% to 66% range, represented by 13 departments, Quindío, Santander, Risaralda, Boyacá, Atlántico, Antioquia, Caldas, Norte de Santander, Valle del Cauca, Tolima, Bolívar, Huila, Meta and Cauca, but the highest concentration is in the 10% to 33% range, made up of 15 departments, Guaviare, Cesar, Magdalena, Cundinamarca, Caquetá, San Andrés, Sucre, Choco, Nariño, Casanare, Córdoba, La guajira, Arauca and Guainía, the departments that are in a critical state between 1% and 10% are Amazonas, Vaupés and Vichada, being a situation that prevails over time as evidenced in the years analyzed, This is a situation that shows concern regarding accessibility and training in Higher Education, since education is one of the indicators of development and social progress in a country, being fundamental for the achievement of social equity and is the key element within the paradigm of sustainable human development. In the official sector, enrollment within the range of 66% to 100% is comprised of 18 departments, including Vaupés, San Andrés, Caquetá, La Guajira, Guainía, Vichada, Guaviare, Choco, Cesar, Norte de Santander, Amazonas, Quindío, Magdalena, Cundinamarca, Cauca, Boyacá, Huaylas, Cauca, Boyacá, Huaylas, Guaylas, Guaylas, Guaviare, Choco, Cesar, Norte de Santander, Amazonas, Quindío, Magdalena, Cundinamarca, Cauca, Boyacá, Huila and Tolima, in the 33% to 66% range are 13 departments, Caldas, Risaralda, Antioquia, Santander, Córdoba, Valle del Cauca, Bolívar, Nariño, Meta, Atlántico, Arauca, Sucre and Casanare, and in the 10% to 33% range is Bogotá.

Departments such as Bogota, which leads the representation of enrollments, are in the private sector, and the department of Atlántico, which occupies the fourth place in representation, presents a 16% higher variation of its enrollments in the private sector compared to the official sector. The departments that presented significant variations in the decrease in the level of training of their teachers in 2009 compared to 2013 were Cordoba with 3.7% and Santander with 0.3%, the others presented lower or no differences than those mentioned.

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