

**Variables that Influence the Performance of Nursing Students  
at the Universidad del Magdalena in the SABER PRO Tests**

**Variáveis que influen el desempeño de los estudiantes de enfermería  
de la Universidad del Magdalena en las pruebas SABER PRO**

**Variáveis que influenciam o desempenho de estudantes de enfermagem  
da Universidad del Magdalena nas provas do SABER PRO**

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**Abstract:** Objective: To analyze the relationship between personal, family, and institutional variables with the performance in the SABER PRO tests from 2016 to 2019 of nursing students at the Universidad del Magdalena (Colombia). Methodology: Descriptive correlational study. The analysis of the scores obtained in the generic and specific modules of the SABER PRO tests of the nursing students of the Universidad del Magdalena was carried out. Descriptive and inferential analyses were performed using Infostat/L software. Results: The performance in the different modules of the SABER PRO tests was found to be associated with personal variables such as younger age, male gender, and rural residence; family variables such as access to cable television service, ownership of a computer and video game console, residence in a permanent home and no dependents; and institutional variables such as the mean value of tuition fees and scholarships. Conclusions: Personal, family, and institutional variables were identified that are associated with better performance on state tests. These findings highlight the importance of considering multiple individual and contextual factors, when addressing academic achievement and educational equity. It is suggested that educational policies and programs should be designed to reduce existing gaps in these variables and provide equitable access to resources and learning opportunities for all students.

**Keywords:** academic performance; universities; nursing education; nursing students.

**Resumen:** Objetivo: Analizar la relación entre las variables personales, familiares e institucionales con el desempeño en las pruebas SABER PRO del periodo 2016 a 2019 de los estudiantes de enfermería de la Universidad del Magdalena (Colombia). Metodología: Estudio de tipo descriptivo, correlacional. Se realizó el análisis de los puntajes objetivos en los módulos genéricos y específicos de las pruebas SABER PRO, extrayendo los puntajes de los estudiantes de la carrera de Enfermería de la Universidad del Magdalena. Se realizó

el análisis descriptivo e inferencial utilizando el programa Infostat/L. Resultados: El desempeño en los distintos módulos de las pruebas SABER PRO se encontró asociado a variables personales como la menor edad, género masculino y área de residencia rural; variables familiares como el acceso a servicio de televisión por cable, la tenencia de computadora y de consola de videojuegos; residir en un hogar permanente y no tener personas a cargo; y variables institucionales como el valor intermedio de la matrícula y la tenencia de becas. Conclusiones: Se identificaron variables personales, familiares e institucionales que se relacionan con un mejor desempeño en las pruebas de estado. Estos hallazgos destacan la importancia de considerar múltiples factores tanto individuales como contextuales al abordar la mejora de los resultados académicos y la equidad educativa. Se sugiere que las políticas y programas educativos deberían dirigirse hacia la reducción de las brechas existentes en relación con estas variables, proporcionando un acceso equitativo a recursos y oportunidades de aprendizaje para todos los estudiantes.

**Palabras clave:** rendimiento académico; universidades; educación en enfermería; estudiantes de enfermería.

**Resumo:** Objetivo: Analisar a relação entre variáveis pessoais, familiares e institucionais com o desempenho nas provas SABER PRO de 2016 a 2019 de estudantes de enfermagem da Universidad del Magdalena (Colômbia). Metodologia: Estudo descritivo, correlacional. Foi realizada a análise das pontuações objetivas nos módulos genéricos e específicos dos testes SABER PRO, extraindo as pontuações dos alunos da carreira de Enfermagem da Universidad del Magdalena. A análise descritiva e inferencial foi realizada por meio do programa Infostat/L. Resultados: Verificou-se que o desempenho nos diferentes módulos dos testes do SABER PRO está associado a variáveis pessoais como idade mais jovem, sexo masculino e área de residência rural; variáveis familiares, como acesso ao serviço de televisão a cabo, posse de computador e console de videogame, residir em casa própria e não ter dependentes, e variáveis institucionais, como valor intermediário de mensalidades e bolsas de estudo. Conclusões: Foram identificadas variáveis pessoais, familiares e institucionais que estão relacionadas com um melhor desempenho nos testes estaduais. Esses achados destacam a importância de considerar múltiplos fatores, tanto individuais quanto contextuais, ao abordar a melhoria dos resultados acadêmicos e da equidade educacional. Sugere-se que as políticas e programas educacionais sejam direcionados para reduzir as lacunas existentes em relação a essas variáveis, proporcionando acesso equitativo a recursos e oportunidades de aprendizagem para todos os alunos.

**Palavras-chave:** desempenho acadêmico; universidades; educação em enfermagem; estudantes de enfermagem.

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## Introduction

In Colombia, the State Examination on the Quality of Higher Education (SABER PRO) is a standardized instrument used to evaluate the quality of technical-university level education. It consists of a set of questions that evaluate generic and specific competencies. The generic ones are applied to students of all training programs and include the areas of critical reading, quantitative reasoning, written communication, English and citizenship competencies, while the specific ones evaluate competencies specific to the area of professional training, <sup>(1)</sup> which in the case of nursing are grouped in health care and health promotion and disease prevention. <sup>(2)</sup>

The purpose of this type of standardized test is to generate a report on the extent or level of skill development based on general knowledge that students have attained during their education. <sup>(3)</sup> Furthermore, the Ministry of Education utilizes these tests to oversee and assess the quality of higher education within the country, as well as to formulate policies aimed at enhancing the education system. <sup>(2)</sup>

Tests like SABER PRO can aid in comprehending the necessary adjustments that programs need to enhance their quality. Nevertheless, these standardized tests are uniform across the entire population and do not account for socioeconomic, cultural, demographic, and infrastructure variations, among other factors. Consequently, they may yield results with a certain degree of error concerning the quality of education offered in specific areas. <sup>(4)</sup>

Numerous studies have thoroughly examined the correlation between academic performance and various socio-demographic and economic factors affecting students. These factors include age, gender, family circumstances, place of origin, prior education (such as possession of diplomas or previous higher education), high school performance and duration, as well as the financial resources available for sustenance. <sup>(5-7)</sup> Therefore, it is imperative to assess the predictive capability of these factors on student performance, considering their influence on the learning process, academic achievements, and the development of clinical competencies. These aspects are pivotal in the pursuit of educational excellence by higher education institutions. <sup>(5)</sup>

In a competitive work environment, having a strong foundation of knowledge, skills, and competencies is essential for achieving better integration into the labor market. <sup>(8)</sup> For higher education institutions it is imperative to study student performance and its associated variables. Moreover, as in the field of health sciences, especially in nursing, the professional role includes the provision of care to healthy subjects or those with various health disorders, it is necessary to analyze the variables that may influence the quality of their training and performance.

Hence, it is deemed significant to analyze the relationship between personal, family, and institutional factors and the performance of nursing students at the Universidad del Magdalena (Colombia) in the SABER PRO tests conducted from 2016 to 2019. This analysis aims to establish the associations between these variables and the overall test outcomes as well as performance in specific competency groups.

## Method

A descriptive correlation study was carried out with a population of 240 students, which corresponded to the total number of students of the nursing career of the Universidad del Magdalena who took the SABER PRO state exam for the period 2016 to 2019.

The period from 2016 to 2019 was chosen because the latest version of the SABER PRO exam was implemented in 2016, and in 2020, due to the intrusion of the COVID-19 pandemic, its format was modified, leading to the elimination of several evaluation components.

The global and objective scores in the generic and specific modules of the SABER PRO tests were obtained from the open access database of the Colombian Institute for the Evaluation of Education – ICFES. The data were downloaded in .csv format and entered a Microsoft Excel database.

The modules of generic and specific competencies were downloaded for all students in the country in the period analyzed, then the observations of careers other than nursing were eliminated and through a Python algorithm the results of both competencies (generic and specific) were linked, since they were in different databases. This was done using the student codes (EK).

The variables of interest are defined in the “Dictionary of variables Saber PRO period 2012-2019” and some of them are mentioned below:

1. Personal information: this module asks about aspects such as the student’s gender (male, female), age, place of residence (rural, urban), department and commune of residence, among others.
2. Academic and citation information: This module inquiries about aspects such as the institution of higher education (name and type), the place where the student took the exam, tuition fees, scholarships, or educational loans, among others.
3. Socioeconomic and Family Information: This module asks about family aspects such as parents' educational level and occupation, students' occupation, services available at home (TV, Internet, drinking water, etc.), socioeconomic level, among others.

In terms of generic competences, they are defined as:

- Written Communication: Evaluates the ability to communicate ideas in writing on a given topic. The topics on which the writing is based are in the public domain and do not require specialized knowledge.
- Quantitative Reasoning: Evaluates competencies related to mathematical skills to function appropriately in everyday contexts involving quantitative information.
- Critical Reading: Assesses the ability to understand, interpret, and evaluate texts found in everyday life and in non-specialized academic settings.
- Citizenship Competence: Evaluates the knowledge and skills that enable the construction of frameworks for understanding the environment that promote the exercise of citizenship and inclusive coexistence in accordance with the Constitution.
- English: Assesses the ability to communicate effectively in English. This competency, which is aligned with the Common European Framework, allows for the classification of examinees according to their level of proficiency.

The definitions of the specific nursing competencies are:

- Health Care: This module assesses the competence that allows the application of basic public health concepts that determine the prioritization of actions to be followed

- according to the health conditions of the individual, the family, and the community, within the national and international political and regulatory framework. Evidence will be sought that the student analyzes the personal, social, economic and environmental determinants that influence the health status of the individual, the family and the community, for the prioritization of actions to follow; proposes diagnostic, implementation and evaluation actions within the framework of current health policies and guidelines; Recognizes the national policies and regulations and the international agreements signed by the Colombian State related to public health and applies them in concrete situations that affect the health of the individual, the family and the community and integrates the process of systematization of information related to the health of the individual, the family and the community in the prioritization of actions.
- Health Promotion and Disease Prevention: This module assesses the ability to apply the basic concepts of health promotion and disease prevention that allow the prioritization of actions to follow according to the health conditions of individuals, populations, and current regulations. Evidence will be sought that the student integrates the basic concepts of health promotion that allow him/her to prioritize actions to be taken according to the health status of the population, and that he/she integrates the basic concepts of disease prevention that allow him/her to prioritize actions to be taken according to the health status of the population.

Descriptive statistical measures such as absolute ( $n$ ) and relative (%) frequencies were calculated for data analysis. Relationships between variables were calculated using Mann-Whitney U test, Kruskal-Wallis test, and Spearman's correlation test (Rho). The significance level (LS) was set at  $p = <0.05$ .

The present work is a "no-risk" study because of its observational nature and the use of publicly available data. The ethical aspects described in the bibliography were respected. <sup>(9)</sup>

## Results

The sample consisted of 240 nursing students from the Universidad del Magdalena from the years 2016 to 2019. The mean age of the students who took the test was 23.29 (SD 3.09), with ages ranging from 19 to 38 years. The students were mostly female (78.33 %), 37.91 % were single, 7.50 % of them identified with some ethnic group, 47.50 % had a high school education with academic orientation, 32.08 % were from rural areas and only 6.25 % reported being heads of households (Table 1). It should be noted that the variable ethnicity includes 87 minority groups categorized in the country, and the term refers to common cultural characteristics such as language, ancestry, cultural practices, and beliefs, which are recognized in Resolution 166 of 2005 in its annex "List of ethnicities".

**Table 1 - Characterization of the sample of nursing students (2016-2019)**

| Dimensions                       | Variables                   | Category                        | n            | %      |
|----------------------------------|-----------------------------|---------------------------------|--------------|--------|
| Personal variables               | Age                         | Mean (DE)                       | 23.29 (3.09) |        |
|                                  | Ethnicity                   | Yes                             | 18           | 7.50   |
|                                  |                             | No                              | 146          | 60.83  |
|                                  |                             | Not reported                    | 76           | 31.67  |
|                                  | Bachelor's degree obtained  | Academic                        | 114          | 47.50  |
|                                  |                             | Pedagogical                     | 5            | 2.08   |
|                                  |                             | Technical                       | 45           | 18.75  |
|                                  |                             | Not reported                    | 76           | 31.67  |
|                                  | Marital status              | Single                          | 91           | 37.92  |
|                                  |                             | Married/Common-law marriage     | 11           | 4.58   |
|                                  |                             | Divorced                        | 1            | 0.42   |
|                                  |                             | Not reported                    | 137          | 57.08  |
|                                  | Gender                      | Woman                           | 188          | 78.33  |
|                                  |                             | Man                             | 52           | 21.67  |
|                                  | Area of residence           | Rural                           | 16           | 6.67   |
|                                  |                             | Urban                           | 163          | 67.92  |
|                                  |                             | Not reported                    | 61           | 25.42  |
|                                  | Hours of work per week      | Do not work                     | 123          | 51.25  |
|                                  |                             | Less than 10 hours              | 31           | 12.92  |
|                                  |                             | 11-20 hours                     | 30           | 12.50  |
|                                  |                             | 21-30 hours                     | 22           | 9.17   |
|                                  |                             | More than 30 hours              | 30           | 12.50  |
|                                  |                             | Not reported                    | 4            | 1.67   |
|                                  | Dedication to daily reading | I do not read for entertainment | 6            | 2.50   |
|                                  |                             | 30 minutes or less              | 51           | 21.25  |
|                                  |                             | 30-60 minutes                   | 67           | 27.92  |
|                                  |                             | 1-2 hours                       | 24           | 10.00  |
| More than 2 hours                |                             | 16                              | 6.67         |        |
| Not reported                     |                             | 76                              | 31.67        |        |
| Internet usage per day           | Less than 1 hour            | 32                              | 13.33        |        |
|                                  | 1-3 hours                   | 94                              | 39.17        |        |
|                                  | More than 4 hours           | 38                              | 15.83        |        |
|                                  | Not reported                | 76                              | 31.67        |        |
| Do you have at home...           | Internet                    | 172                             | 71.67        |        |
|                                  | Computer                    | 188                             | 78.33        |        |
|                                  | TV service                  | 162                             | 67.50        |        |
|                                  | Video game console          | 23                              | 9.58         |        |
| Head of household                | Yes                         | 15                              | 6.25         |        |
|                                  | No                          | 149                             | 62.08        |        |
|                                  | Not reported                | 76                              | 31.67        |        |
| Number of books in the household | 0-10 books                  | 60                              | 25.00        |        |
|                                  | 11-25 books                 | 49                              | 20.42        |        |
|                                  | 26-100 books                | 42                              | 17.50        |        |
|                                  | More than 100 books         | 13                              | 5.42         |        |
|                                  | Not reported                | 76                              | 31.67        |        |
| Scholarship tuition payment      | Yes                         | 49                              | 20.42        |        |
|                                  | No                          | 191                             | 79.58        |        |
| Test training                    | No training                 | 13                              | 5.42         |        |
|                                  | Self-study                  | 84                              | 35.00        |        |
|                                  | Preparation course          | 143                             | 59.58        |        |
| Period                           | 2016                        | 49                              | 20.42        |        |
|                                  | 2017                        | 61                              | 25.42        |        |
|                                  | 2018                        | 54                              | 22.50        |        |
|                                  | 2019                        | 76                              | 31.67        |        |
| Total                            |                             |                                 | 240          | 100.00 |

At a comparative level, the maximum score that can be obtained in these tests is 300, and in the periods analyzed, the mean scores (performance) in the analyzed competencies of the students of the Universidad del Magdalena were higher than those of the Colombian Caribbean Region and those of other institutions in the Department of Magdalena (Table 2).

**Table 2 - Mean scores in the different modules evaluated in the SABER PRO test of nursing students (2016-2019)**

|                                  | QR     | CR     | CC     | EN     | WC     | GS     | HC     | HP     |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>Caribbean Region</b>          | 133.25 | 139.78 | 133.13 | 135.39 | 140.65 | 135.75 | 139.38 | 141.73 |
| <b>Department</b>                | 122.15 | 126.33 | 124.48 | 127.44 | 137.43 | 126.76 | 127.44 | 134.75 |
| <b>Universidad del Magdalena</b> | 150.69 | 157.18 | 146.22 | 147.92 | 149.21 | 149.59 | 156.65 | 166.87 |

**Note:** QR: Quantitative Reasoning; CR: Critical Reading; CC: Citizenship Competence; EN: English; WC: Written Communication; GS: Global Score; HC: Health Care; HP: Health Promotion and Disease Prevention.

### *Generic competences*

Relationships were identified between the variables age and gender with the Quantitative Reasoning module scores. In this regard, males obtained higher mean scores (156.44 vs. 149.10;  $p = 0.03$ ) and age obtained a negative correlation such that the younger the age, the better the performance ( $Rho = -0.26$ ;  $p < 0.01$ ). Although a higher mean score was found for students who did not own a video game console, this finding was not statistically significant (149.93 vs. 141.93;  $p = 0.06$ ).

In the Critical Reading module, a relationship was identified between the variables age and dependents, so that the younger the age, the better the performance on the test ( $Rho = -0.25$ ;  $p < 0.01$ ) and those without dependents obtained higher scores (158.39 vs. 146.10;  $p = 0.01$ ).

As for Written Communication, better performance was identified in those from rural areas (156.38 vs. 147.99;  $p = 0.02$ ) and in those who had paid their university tuition through a scholarship (158.08 vs. 146.94;  $p = 0.01$ ). Age was found to be associated with performance in this module, with a negative correlation ( $Rho = -0.17$ ;  $p < 0.01$ ).

In the English module, a negative correlation was found between English score and age ( $Rho = -0.24$ ;  $p < 0.01$ ). Computer and television ownership were found to be associated with this module score, such that those with computers (149.74 vs. 141.13;  $p = 0.02$ ) and televisions (150.10 vs. 143.07;  $p = 0.02$ ) had higher scores. Similarly, a higher mean was found in the performance of students in 2019 ( $p = 0.01$ ).

Regarding the Citizenship Competence module score, age was found to be associated with performance, with a negative correlation between it and the scores ( $Rho = -0.16$ ;  $p = 0.01$ ).

### *Specific nursing competencies*

When evaluating the specific competencies, a negative correlation was found between age and the score in the Health Care module ( $Rho = -0.24$ ;  $p < 0.01$ ) and an association with better performance in the 2019 period ( $p < 0.01$ ). Higher means in this module were found in students with tuition values between 500,000 and 1,000,000 Colombian pesos compared to the other subgroups ( $p < 0.01$ ), as well as in those who lived in their permanent home compared to those who lived in temporary rented spaces (155.56 vs. 148.38;  $p = 0.04$ ).

Scores on the Health Promotion and Disease Prevention module were found to be associated with better performance in 2017 ( $p = <0.01$ ), as well as with living in a permanent home (174.93 vs. 161.94;  $p = <0.01$ ).

Finally, it was found that the best performance on the general level (Global Score) of the assessment was associated with having no dependents (150.01 vs. 141.50;  $p = 0.01$ ).

Type of secondary school attended, marital status, ethnicity, parents' education level, socioeconomic level, employment status, and completion of courses, workshops, and preparatory tests (simulations) in all their variations were not found to be associated with performance on the Global Score or any of its modules. Although at the descriptive level there was a trend for better scores in the various modules in relation to the number of books available at home, this finding was not statistically significant.

## Discussion

In recent years, several studies have been conducted to investigate the variables that can predict the academic success of students, given the interest of educational centers in improving their selection, training, and support processes during the student's progress through the study plan, to generate adjustments that lead to lower dropout rates and better performance. Various personal and family factors have been described, such as age, gender, previous education, parents' education level, nationality, employment status, socioeconomic status, spirituality, and having dependents, as factors related to better grades.<sup>(10-15)</sup> Likewise, institutional variables such as scholarships and tuition fees are also factors to be considered, as they represent pressures that force students to maintain optimal performance and not delay their graduation.

The present study found an inversely proportional relationship between age and the different modules of the test, with younger students performing better. This finding is supported by the literature, which describes a greater capacity for learning in younger students, in addition to the fact that they generally have fewer family responsibilities and do not work.<sup>(16-20)</sup> This also explains why students without dependents obtained higher average scores than those with dependents. A study conducted on a sample of 376 health sciences university students found that the presence and number of children were related to academic performance.<sup>(21)</sup> Having children, being financially responsible for the family, caring for younger siblings or a sick relative are variables to consider when assessing students' academic performance<sup>(22)</sup> and are associated with a higher likelihood of missing classes, falling behind on homework and academic activities, receiving low grades, and dropping out of college.

Regarding gender, a study conducted in Italy<sup>(23)</sup> and another in Mexico<sup>(12)</sup> found that women performed better in the course than men. However, these findings contrast with the results of the present study, in which a relationship between gender and performance was found only in the Quantitative Reasoning module, where men obtained higher averages, although these data are corroborated by other studies.<sup>(24, 25)</sup>

Often, working students have difficulty meeting academic demands due to work hours, workload, night work, and other factors.<sup>(26)</sup> A study conducted in Argentina<sup>(14)</sup> found that nursing students who worked had lower academic success rates; however, in our population, no relationship was found between the variable of work status and performance in the exam modules.

Studies such as Fooladi et al.<sup>(6)</sup> have mentioned that student achievement is related to a stimulating educational environment with comprehensive training, a formal support



structure, and a quality teaching staff. Although these variables were not addressed in the present study, it is interesting as a future line of research to investigate the role of these variables on academic performance.

Regarding the migration from other regions to study in the Department of Magdalena and its relationship with academic performance, it was found that students who resided in a permanent home in the city obtained higher averages in different areas of the evaluation of the SABER PRO tests. This finding is similar to that of a study conducted in Australia <sup>(6)</sup> which reported that the academic performance of foreign students and those from areas outside the metropolitan area was lower.

Although socioeconomic level was not related to students' performance in the different modules of the test, higher average scores in Written Communication were observed among those from rural areas and those who entered the institution through scholarships. In Colombia, scholarships are granted to students from rural areas and to those who perform well in the State Intermediate Examination (SABER 11), and admission to many of the country's public institutions is done through entrance exams, which would explain this finding. <sup>(27)</sup> A previous study conducted in a public higher education institution found better performance among students from rural areas and low income levels, <sup>(16)</sup> since education is a way out of poverty and a possibility for social advancement. <sup>(5)</sup>

It is necessary for the state not only to guarantee access to quality higher education, but also to create conditions for the full development of students and to ensure that socio-economic variables do not affect the level of student development. <sup>(28-30)</sup>

## Conclusion

It was observed that the students of the 2016-2019 period of the Universidad del Magdalena obtained higher average SCORES in all the components evaluated in the SABER PRO test, compared to the averages of the scores of the Colombian Caribbean Region and the Department of Magdalena.

With regard to the objective of the study to analyze the relationship between personal, family and institutional variables with the performance in the SABER PRO tests of the nursing students of the Universidad del Magdalena (period 2016-2019), it is concluded that the variables associated with a better performance in the different modules evaluated are being younger, coming from a rural area, having a total or partial scholarship for studies, living permanently in a place, having a computer and a television (related to the level of purchase) and not having dependents. These variables are associated with a student profile that has more time to invest in studying and has the necessary resources to carry out academic activities, such as a computer and Internet access, in addition to having obtained an adequate result in the entrance exams or in the High School Quality Evaluation Exam (SABER 11).

This work serves as a starting point for designing interventions aimed at improving student performance in the areas identified as priorities, with an emphasis on the so-called specific competencies that are directly linked to professional performance. Likewise, the management of aspects that have a negative impact on academic performance should also be the objective of institutional development plans, seeking to reduce the gaps related to variables such as gender, socioeconomic level, or area of residence.

For future studies, we suggest incorporating into the analysis the grades obtained during the course of the degree and comparing them with the scores obtained in the modules of the SABER PRO tests, in order to identify subjects that are predictors of good or bad

performance in the areas evaluated and to strengthen the former and intervene in the latter, seeking academic excellence and the best possible level of quality of graduates.

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**Data availability:** The dataset supporting the results of this study is available from [https://www2.icfes.gov.co/resultados\\_del\\_examen\\_saber\\_pro](https://www2.icfes.gov.co/resultados_del_examen_saber_pro).

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