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# Nursing technician training: qualification profile

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**Abstract** *The identification of the current vocational training profile of nursing aides and technicians becomes a central element in understanding the dynamics of their qualification in several states, aiming to expose both the existence of trends for under- and overqualification and the participation of the public sector in the offer and expansion of nursing courses in the country. The article explores three relevant aspects of vocational training based on the results found in the research "Nursing Profile in Brazil (FIOCRUZ/COFEN)": the level of schooling/qualification; the geographical distribution and the governmental participation in the consolidation of the current situation. This is an analytical study based on the interpretation of indicators identified by Pearson's Asymmetry Coefficient. The study uses the database generated by the research, as well as data from MEC/Inep and IBGE. The achieved results establish relations between the characteristics of training, distribution of NA&T in all Brazilian states with the phenomenon of overqualification, besides revealing an apparent separation of the Federal Education Network from the actual demand for nursing technicians in the country.*

**Key words** *Nursing profile, Nursing training, Under- and overqualification, Federal Education Network*

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## Introduction

If it is true that the Brazilian University Reform carried out in the 1960s and 1970s – regarded as "the unfolding of the Brazilian miracle in the educational sphere", but that "merely contributed to widen a little further the restricted number of privileges that reach the apex of the pyramid"[1] – there was also nothing democratic or democratizing, besides not altering the quality of higher education, 'either in terms of intensity, rationality and performance'. It is also true to say that, currently, this arena of conflicts and interests is the stage of a process being built since 2003, and that the educational reality, in the last decade, has been implementing countless government projects, programs and policies that sometimes seek the university expansion, sometimes the inclusion, access and permanence of specific population strata in higher education (Prouni, Fies, Sisu, in addition to special programs).

To some extent, this scenario is reflected in the rush to have access to courses for the purpose of obtaining 'diplomas' which, in the context of market uncertainties, have become a requirement for employment access and permanence[1]. However, while access to education becomes increasingly more decisive for the integration of young people and adults into the productive world, for people who live far from large urban centers such access remains difficult, due to the lack of institutions in these regions. When the subject is related to health and life, the issue of qualification gains new and relevant definitions.

In the national scenario, the participation of nurses in the nursing team corresponds to 23% and nursing aides and technicians, to 77%[2]. This is a qualification leap, if we think that, less than 40 years ago[3], the aides represented 63.8% of the nursing team and the nurses only 8.5%. This expansion of access to nursing courses occurred concurrently with two other associated phenomena: the reduction in the number of aides in the nursing team; and the increase in the level of schooling among Nursing Aides and Technicians (NA&T). In 1983[3], 9.6% of NA&T had completed or incomplete higher education; 30 years later, according to data from the Nursing Profile Survey in Brazil (PPEB), this percentage increased to 34.3%[2].

Considering the specificity of nursing organization in different professional categories; the current requirement for mid-level technical training as a minimum threshold for Professional Council membership; and the significant participation of the NA&T in the nursing team, the question of the training of these professionals is a complex one, imposing the choice of central aspects that allow us to understand their current situation.

The analysis of the results of the PPEB[2] that characterize the current picture of this training in the different states was structured based on three associated dimensions: the geographic distribution, the level of education/qualification of the NA&T and the governmental participation in the consolidation of the current picture. Thus, we will seek answers to questions such as: Is there overqualification or underqualification of technicians or is there a coexistence of the two phenomena? What are the states with the highest / lowest qualification rates of these technicians? What was the participation of the federal government in the training of technicians in the states?

The results found need to be contextualized in the recent history of education access expansion experienced in our country. In this sense, it is important to understand that, in addition to constituting a political and ideological instrument to respond to the demands of the markets, education, and especially the professional, must be taken as a defense of social development with justice and well-being.

### The Question of Professional Qualification

The rapid advance of urbanization and technological development processes has been promoting the rupture of physical and cultural boundaries. However, antagonistically, the same processes are widening the gap between the socially included and the socially excluded. In this context, the schooling requirements are linked to a society project that sustains and perpetuates the division between those who have the means of production and those who do not[4]; widening, over the years, the "economic inequality between the 'organizers' – increasingly exploitative – and the 'performers' – increasingly exploited"[5]. In a capitalist society, school is a "cogwheel within the system"[5] and education reflects the longings of the ruling class that maintain, through the property of knowledge, political hegemony and intellectual leadership as a form of social control and domination, mainly the legal framework that supports the guidelines for worker training.

Following this line of thought, it is possible to see that the new type of production, a rationalized one, requires from the worker adaptation to "the new work methods characterized by auto-

mation, i.e., the absence of mobilization of intellectual and creative energies during work performance"[6]. Therefore, an education that develops critical-reflexive awareness is not necessary for the process of training of the 'alienated productive citizen', that is, the 'worker who maximizes productivity by being a minimum citizen'[7].

In the path of vocational training, its function of responding to the needs of society, in which it is included, makes it possible to institute in its context the subsidies so that social relations, including the world of work, occur in harmony with each historical moment as an equation, of which components involve collective and individual projects. Collectives are made explicit by government policies. Individuals are represented by the aptitudes and desires of the human being, which do not always meet the demands of the collective. A history also characterized by the "structural duality"[6], where the primary and vocational school would be destined for the poor to 'constitute the manual working class', while the propaedeutic and higher education school, the path of the richest of society, 'would constitute the class of the intellectual workers'[6]. This duality, the product of capitalist logic, has forged a stigma in society, a mark that for centuries has associated the teaching of production techniques with slaves, poverty and welfare.

What history shows us is a scenario where the training of technicians was associated with the emphatic appreciation of specific knowledge, directed to the maintenance of the capitalist mode of production. It is noteworthy that this context is even more serious in the case of health, of which work is characterized by the uncertainties arising from the indeterminacy of demands, the discontinuity and the availability to meet all cases, including the exceptional ones.

In this context, the training of NA&T is no exception, because "professional education in health has not historically been characterized by a synchresis, but has been guided, hegemonically, by the epistemological framework of pragmatism"[8]. It has specificities, where the decisions that are to be taken imply in developing a training that essentially expresses the "capacity of one human being to take care of another"[9]. Thus, inserted in the historical contradictions existing in the "social relations of exploitation"[8], the professionalization of these workers through mid-level technical courses, which could, through vocation, enliven and ennoble, acquires the bitter taste of insufficiency, incompleteness for one's career and survival.

Therefore, if continuing training can be considered complementary and necessary for work activities, especially in meeting health demands, the strong investment of technicians in higher-education courses (undergraduate and postgraduate) may represent the influence of the principles of the "human capital theory" in selective processes. In other words, the domain of professional knowledge is being replaced by the measurement of the courses taken; therefore, the technician who has more or higher degree, as an added value to their training, is selected for the job opening. This reality exposes the iniquities of the structural relations of labor that, given also in the scope of education, can be translated as the disguise imposed by capitalism to mask social inequalities, by associating schooling with employment. "It is under the aegis of the "theory" of human capital that educational plans, guidelines and strategies are devised, especially for countries of dependent capitalism, and that is how the idea that social ascension and mobility have a guaranteed path through schooling, through well-paid jobs, is affirmed"[10](p.232), maintaining the hierarchical relationship of power structurally predetermined by the capital[11].

## Method

This is an analytical study of variables from the PPEB[2] database, which seeks to establish associations between the NA&T training and distribution data in the states with the phenomenon of overqualification among these professionals, disclosed in the analysis and presentation of data related to Brazil.

The PPEB[2] was performed by FIOCRUZ, in partnership with the Federal Nursing Council (COFEN) and its methodological aspects have been published[12]. The information used in this study is part of the database originated from the research, of unrestricted public access, available online at the COFEN website.

The study sought to associate the variables 'year of education' and 'type of institution/school supporting entity in which the nursing aide/technician studied' to determine, from a historical perspective, the NA&T training profile. This information was contextualized, when necessary, with data about enrollment, vacancies and graduates from the School Census Microdata Bank (1999-2017)[13] and of Higher Education (2000-2012)[14], available at the Inep website.

To compare research data on the distribution of NA&T in the Brazilian territory, considering

the 26 states and the Federal District (capital and interior), we used information from the Brazilian Institute of Geography and Statistics (IBGE – *Instituto Brasileiro de Geografia e Estatística*)[15,16] of 2013, the year in which the PPEB[2] data collection was started.

To complement the analysis, extending it until 2017, we used information from the Nilo Peçanha Platform (MEC)[17], a virtual environment designed to collect, validate and disseminate the official statistics of the Federal Network of Vocational, Scientific and Technological Educational. Therefore, we aimed to evaluate the evolution of the offer of technical nursing courses in the Federal Network, aiming to identify whether courses are being created in states where PPEB[2] data indicate a larger deficit or whether the established educational capacity is being strengthened by the federal government in places where there is already a significant concentration of often overqualified NA&T.

To measure overqualification in each state, values were assigned to three levels of schooling – a strategy to treat this variable as quantitative. Thus, the categorical variables *'Incomplete/complete elementary school*'; *'Incomplete/complete high school*'; *'Incomplete/complete higher education*' defined in PPEB[2] have been replaced by numerical variables.

Therefore, the categories *'incomplete elementary school*' and *'incomplete high school'* – levels of schooling that fall short of the current minimum requirement for registration with the Professional Council – were assigned a value of zero. The *'complete high school*' and *'incomplete higher education*' categories – which correspond to the required minimum education certification – were assigned a value of 100 and the *'complete higher education*' category was assigned a value of 200.

This maneuver was carried out to understand the frequencies of schooling in a central trend distribution, hypothetically defining an ideal condition in which the left shifting – small, due to the retirement of former nursing aides and assistants who did not have the mid-school level and the current requirement for registration in the Councils – is similar to the right shifting – also small, because the NA&T that reaches a new level tends, in this 'ideal' reality, to abandon the mid-level occupation, replacing it with a new professional identity.

According to this reasoning, the measurement of the right- or left-leaning curve skewness would be able to indicate the balance of the extremes of education, that is, if in the state under analysis there is a greater number of aides and technicians who do not have the complete mid-school level or who have a higher education level. To measure this phenomenon, Pearson's Coefficient of Skewness (PCS) was calculated, defined by the formula:

$$PCS = \frac{(\ 3\ x\ (MEAN\text{-}MEDIAN)\ )/}{(standard\ deviation)}$$

Under these conditions, the higher the concentration of mid-level NA&T, and the more similar are the numbers of these categories at the extremes (level of schooling lower than High School and complete Higher Education or higher), the closer to zero will be the PCS calculated for this state. If the PCS is greater than 1 or if the PCS is less than -1, the distribution of the variable can be considered significantly skewed with right tail or significantly skewed with left tail, respectively.

When analyzing by state, in general, if the number of NA&T without the high school level > number of NA&T with complete higher education level, the greater the difference between these numbers, the further away from zero and negative the PCS values will be –thus being is a potential indicator of *underqualification* of the NA&T group in the assessed state. Conversely, if the number of NA&T without complete high school < number of NA&T with complete higher education level, the greater the difference between these numbers, the further away from zero and positive the PCS values will be – similarly being a potential indication of *overqualification* of the number of NA&T in the state being reviewed.

Aiming to test the most common hypotheses that could justify overqualification in a given state, the correlation of the PPEB[2] variables *total income earned through work as NA&T* and *supporting entities of the Higher Education Institutions* – HEIs – *where the nurses from each state graduated at* was tested with PCS. Therefore, we employed Spearman's Correlation Coefficient (SCC) test to verify the statistical dependence between the classifications of two variables. When the relative classification ($1^{st}$, $2^{nd}$, $3^{rd}$, $4^{th}$, etc.) of the values within two variables is equal, the SCC will be +1. As one or more relative positions differ between the two variables, the SCC value will decrease and be equal to -1, if both variables have a completely opposite classification. Thus, the closer to zero the SCC value, the lower the correlation between the variables.

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## Results

### Between Abundance and Scarcity: Distribution of Nursing Aides and Technicians in Brazil

Data from Inep[13,14] indicate that there was a concentration of health courses in the Southeast region, representing almost half of all enrolled individuals in the country. At the higher education level, the region accounts for 48.2% of nursing graduates, and 46.5% of aides and technicians. At the extreme opposite, the North accounts for 5.6% of nurses' and 7.8% of NA&T's training.

Overall, and in accordance with the data on nursing training obtained at PPEB[2], the information shows that public policies have not been effective in deconcentrating the nursing training apparatus, whether at a higher or technical level, from the Southeast region and in funding with public money, the training – at the technical, undergraduate and postgraduate levels – of this fundamental workforce for SUS. Chart 1 shows that the distribution of NA&T in the states does not follow the proportional distribution of the territorial area or the population among them.

Another relevant characteristic in the territorial distribution of NA&T (Chart 1) is the overconcentration of nurses in the capital cities. It can be verified that, with the exception of 8 states, most NA&T are concentrated in the state capitals. It is worth noting that Manaus, the capital city of the state of Amazonas, has the highest concentration of these professionals (89.6%); however, it also concentrates 52.1% of the state's population.

The capitals of the following states show the highest NA&T super-concentrations: Santa Catarina (35% of NA&T for 6.8% of the state population); Minas Gerais (53.6% for 12%); Bahia (75.2% for 19.2%); Maranhão (60.3% for 15.5%); Rio Grande do Sul (49.2% for 13.2%); Para (60.8% for 17.9%); Paraíba (65.85% for 19.7%); Mato Grosso (58.9% for 17.9%) and Curitiba (52.8% for 16.8%).

Similarly, considering the number of NA&T in each state and its capital as a parameter of care, i.e., considering the number of professionals per thousand inhabitants – calculated based on PPEB[2] data and information on the population[16] (Chart 1) – intra-state inequalities appear and may be even greater than inter-state or inter-regional inequalities. Thus, Roraima, for instance, with the lowest rate of NA&T/1,000 inhabitants (3.87), and its capital (Boa Vista) showing a different reality, with 5.19. The largest differences between these rates were observed between Belo Horizonte (26.26) and Minas Gerais (5.90); Salvador (20.19) and Bahia (5.15); Florianópolis (19.81) and Santa Catarina (5.82); and Belém (19.69) and Pará (5.79).

On the other hand, it should be noted that the relative participation of nurse aides and technicians in the nursing team is generally lower in the capitals than in the states as a whole. This means that most of the interior of the country has health care based and dependent on these professionals, that is, in general, a worse qualified assistance than that found in the capitals, where the participation of nurses in the team is relatively higher. Only in the capital cities of the states of Amazonas, Bahia, Rio Grande do Norte, Sao Paulo, Parana, Santa Catarina and Mato Grosso do Sul there is a greater relative participation of NA&T than in the state as a whole.

### Expansion of Schooling: Increasing number of graduates and level of education

In the current context of constant transformations, the health area has maintained the differential of not replacing the worker by technology at an accelerated rhythm, despite being a sector of intense, deep and accelerated technological incorporation. This profile tends to attract increasingly more professionals who, in search of training to work in the sector, stimulate the growth of the offer of courses in the country. Nursing, while a hegemonic portion in health, is a good reflection of this scenario. Between 2000 and 2012, 684 new nursing courses were created, going from 183 to 867 in the period, representing a 450% increase in the number of openings and 750% in the number of graduating students[14].

Corroborating this trend of seeking qualification, according to data from PPEB[2], approximately 28.5% of NA&T in the country have already finished or are attending a higher education course, of which 63.7% in nursing. This means that of the total number of NA&T working in the country, 18.1% attended or are attending a course in the area[2].

Several aspects have been added, in a multifaceted, multidetermined and complex reality, to determine the phenomenon that received the nickname of superqualification or overqualification: (1) the market uncertainties that generate the worker's sense of necessity to acquire a number of varied and differentiated professional skills that, materialized in daily life, could represent the difference between being employed or unem-

**Chart 1.** Nursing Aides and Technicians in Brazil: population, distribution and participation in the nursing team.

| States | Pop. 2013[a] | Pop. 2013a in capital city (%) | NA&Tb (n) | NA&Tb in the capital city (%) | NA&T in the teamb (%) | NA&T in the teamb in the capital city (%) |
|---|---|---|---|---|---|---|
| **North** | | | | | | |
| Acre | 776,463 | 46.0 | 4,604 | 73.7 | 73.3 | 71.3 |
| Amazonas | 3,807,921 | 52.1 | 32,621 | 89.6 | 79.8 | 80.5 |
| Amapá | 734,996 | 59.5 | 8,778 | 75.6 | 86.8 | 84.9 |
| Pará | 7,969,654 | 17.9 | 46,163 | 60.8 | 84.1 | 82.0 |
| Rondônia | 1,728,214 | 28.1 | 10,924 | 38.0 | 79.6 | 79.2 |
| Roraima | 488,072 | 63.3 | 1,887 | 85.0 | 76.8 | 75.7 |
| Tocantins | 1,478,164 | 17.5 | 10,989 | 41.1 | 74.6 | 74.0 |
| **Northeast** | | | | | | |
| Alagoas | 3,300,935 | 30.2 | 14,945 | 61.6 | 78.7 | 75.8 |
| Bahia | 15,044,137 | 19.2 | 77,412 | 75.2 | 74.2 | 76.3 |
| Ceará | 8,778,576 | 29.1 | 42,016 | 66.2 | 74.8 | 72.5 |
| Maranhão | 6,794,301 | 15.5 | 32,221 | 60.3 | 75.3 | 74.5 |
| Paraíba | 3,914,421 | 19.7 | 22,563 | 65.9 | 71.9 | 70.1 |
| Pernambuco | 9,208,550 | 17.4 | 56,910 | 52.2 | 77.8 | 73.2 |
| Piauí | 3,184,166 | 26.3 | 21,301 | 60.3 | 75.9 | 73.7 |
| Rio Grande do Norte | 3,373,959 | 25.3 | 21,235 | 64.0 | 77.1 | 77.3 |
| Sergipe | 2,195,662 | 28.0 | 14,184 | 64.1 | 81.6 | 75.7 |
| **Southeast** | | | | | | |
| Espírito Santo | 3,839,366 | 9.1 | 33,033 | 21.8 | 78.0 | 72.5 |
| Minas Gerais | 20,593,356 | 12.0 | 121,544 | 53.6 | 74.7 | 73.9 |
| Rio de Janeiro | 16,369,179 | 39.3 | 179,769 | 49.9 | 80.9 | 79.8 |
| São Paulo | 43,663,669 | 27.1 | 348,227 | 63.1 | 77.1 | 77.6 |
| **South** | | | | | | |
| Paraná | 10,997,465 | 16.8 | 60,843 | 52.8 | 76.5 | 80.9 |
| Rio Grande do Sul | 11,164,043 | 13.2 | 91,591 | 49.2 | 81.8 | 79.4 |
| Santa Catarina | 6,634,254 | 6.8 | 38,588 | 35.0 | 77.2 | 79.2 |
| **Midwest** | | | | | | |
| Goiás | 6,434,048 | 21.7 | 34,943 | 45.7 | 75.4 | 69.1 |
| Mato Grosso do Sul | 2,587,269 | 32.2 | 13,773 | 53.6 | 75.1 | 75.7 |
| Mato Grosso | 3,182,113 | 17.9 | 16,227 | 58.9 | 72.2 | 70.4 |
| Distrito Federal | 2,789,761 | 100.0 | 32,532 | 21.1 | 75.0 | 54.8 |

NA&T = Nursing Aides and Technicians.
Sources: (a) IBGE; (b) PPEB[2]. The authors

ployed; (2) the real need – the market's – for a diploma, which is becoming a requirement for employment; and (3) the increase in the number of openings to the most impoverished sectors of the population, especially by private colleges, driven by the education business community. Added to this is the fact that the Regional Nursing Councils have failed to provide professional registration to nursing aides, which can be seen by the workers as a trend towards a demand for higher level of schooling.

Thus, as expected, the calculation of the PCS showed a predominance of the positive coefficient in 24 states and the DF (Chart 2), which indicates the existence of a number of overqualified aides and technicians in these locations. The PCS was slightly negative only in the states of Maranhão and Rio Grande do Sul, indicating that the

**Chart 2.** PCS and PPEB variables used in the correlation test.

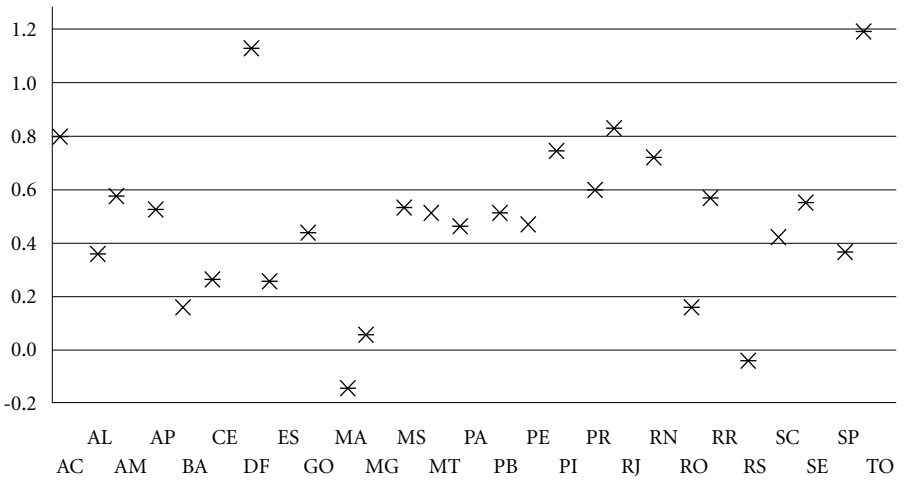
| States | PCS[a] | Public HEIs in higher education training in the nursing areab (%) | Mean total income earned by NA&T.[b,c] |
|---|---|---|---|
| **North** | | | |
| Acre | 0.8 | 75.0 | 2.8 |
| Amazonas | 0.6 | 42.8 | 2.7 |
| Amapá | 0.5 | 72.3 | 3.3 |
| Pará | 0.5 | 72.4 | 2.9 |
| Rondônia | 0.2 | 24.4 | 2.7 |
| Roraima | 0.6 | 46.7 | 3.0 |
| Tocantins | 1.2 | 21.1 | 2.8 |
| **Northeast** | | | |
| Alagoas | 0.4 | 54.6 | 2.4 |
| Bahia | 0.2 | 38.9 | 3.2 |
| Ceará | 0.3 | 47.9 | 2.3 |
| Maranhão | -0.1 | 40.5 | 2.2 |
| Paraíba | 0.5 | 36.1 | 2.6 |
| Pernambuco | 0.5 | 51.9 | 2.7 |
| Piauí | 0.7 | 61.8 | 2.5 |
| Rio Grande do Norte | 0.7 | 67.0 | 2.8 |
| Sergipe | 0.6 | 58.2 | 2.4 |
| **Southeast** | | | |
| Espírito Santo | 0.3 | 22.0 | 2.5 |
| Minas Gerais | 0.1 | 25.2 | 2.8 |
| Rio de Janeiro | 0.8 | 40.6 | 3.6 |
| São Paulo | 0.4 | 24.8 | 3.7 |
| **South** | | | |
| Paraná | 0.6 | 37.0 | 2.9 |
| Rio Grande do Sul | -0.04 | 37.6 | 3.1 |
| Santa Catarina | 0.4 | 36.8 | 3.5 |
| **Midwest** | | | |
| Goiás | 0.4 | 17.5 | 2.9 |
| Mato Grosso do Sul | 0.5 | 40.8 | 2.9 |
| Mato Grosso | 0.5 | 43.0 | 2.7 |
| Distrito Federal | 1.1 | 38.0 | 4.5 |

(a) Pearson's Coefficient of Skewness; (b) Source: PPEB[2]; (c) Mean, in minimum wages, of the total income earned in all jobs as a nursing aide or technician (minimum wage/2013 = R$680.00); NA&T = Nursing Aides and Technicians.
Source: The authors.

number of workers without the high school level of education is still higher than those who have already finished graduation.

In Graph 1, PCS dispersion values shows trends of under- and overqualification per state. What is evident in the overall picture, is the overqualification as the stimulant of markets in most states, but emphasis should be given to the Federal District and Tocantins, the only ones with an indicator > 1 (one), i.e., a distribution curve considered to be significantly asymmetric with a tail to the right, which represents a number of NA&T with level of schooling above that required for the performance of their duties, which is significantly higher than the number of NA&T without the currently required minimum training.

One of the aspects that possibly influence the tendency of overqualification of a number of workers is the access to the public university. In this sense, we used the relative participation of public HEIs in the training of nurses – one of the PPEB[2] variables – as an indicator of accessibility




**Graph 1.** Distribution of under and overqualification indicator – PCS by state – Brazil.

Source: PPEB[2] – 2013. FIOCRUZ/COFEN. The authors.

and evaluated its correlation with the PCS – in this study, treated as an indicator of under- or overqualification of NA&T in a state (Table 2).

Analyzing the profile of the three states with the lowest PCS (Chart 2), the percentage of nurse training in public HEI ranges from 25.2% to 40.5%. In the three states with the highest PCS, this percentage ranges from 21.1% to 40.6%. Applying the SCC, the value of rho = 0.312 (p-value = 0.113) indicates that there is a low correlation between state vocation for nurse training in public HEIs and the PCS. This may point to a scenario in which a higher possibility of attending higher education in a public institution does not translate into a determining factor for the qualification of NA&T.

The same can be said of the possibility of correlating average salary levels practiced in the states for NA&T with the overqualification indicator. The three states with the lowest PCS rank respectively, last (27$^{th}$), 7$^{th}$ and 14$^{th}$ in the ranking of states with the highest average salaries for NA&T. And for the three states with the highest PCS, the positions in the abovementioned ranking are 15$^{th}$, 1$^{st}$ and 3$^{rd}$ places, respectively. Calculating the SCC, the value of rho = 0.195 (p-value = 0.328) indicates a low and non-significant correlation. Thus, the salary level practiced for NA&T seems to influence but not to determine state overqualification.

### The Privatization of the Nursing Aide and Technician Training and the Federal Network Participation

In the last 40 years, private educational institutions have expanded schools and openings throughout the territory, taking over, almost as a monopoly, the training of health professionals.

In the 1999 School Census[13], private initiative accounted for 62% of mid-level technical education in health, while in that same year only 44% of the total enrollment in technical-level vocational education, overall, came from the private sector. The greater participation of the private sector in health technical training increased further, over the following decade and, in 2009[13], only 24.7% of those enrolled in technical courses in health had their training in public technical schools.

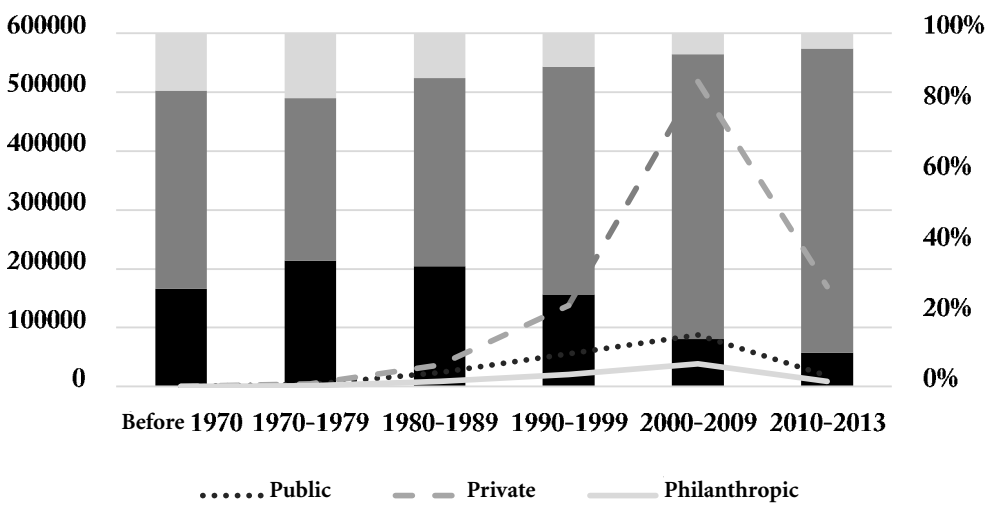
The results of PPEB[2] reinforce the need to formulate public policies with the potential to interfere with the predominant supply of the private sector in the health area. The survey data[2] show that, over the years, private institutions have

expanded their operations. Between the years 1970 and 1979, approximately 10,000, or 61.6% of NA&T, completed their respective courses in private schools (for profit: 44% and non-profit: 17.6%). Between the years 1980 and 1989, the number of graduates increased to around 72,000, with 62.5% in private schools (for profit: 50.4% and non-profit: 12.1%). In the following decades, the number of graduates increased and, in 2009, it exceeded 600,000 graduates, with private schools participating with 83.8% (for profit: 78% and non-profit: 5.8%). In the first years of the following decade, despite the reduction in the number of graduates in absolute values (since they are graduates of only 4 years: 2010 to 2013), the percentage of graduates in private courses reached 88.8% (Graph 2).

Data from the research[2] (Graph 2) suggest that the training profile scenario showed no signs of change between the decades. The participation of public institutions remained well below those of the private education sector. Considering only the performance of the Federal Network, the data provided by the School Census[13] and the Nilo Peçanha Platform[17] show a certain separation of the Federal Institutions regarding the policies of human resources training for the health area. The technical nursing course itself is apparently not considered to be a priority.

In 2009, the year after the creation of the Federal Network, the School Census[13] registered 2,421 individuals enrolled in the 26 technical nursing courses offered by the Federal Institutions. In 2017, this training was offered in 36 units, with a total of 4,294 students [17], i.e., 1,873 new enrollments, a non-significant increase compared to the total increase of the Federal Network between 2009 and 2017. In absolute numbers, it meant an increase from 86,000 to 564,000 enrollments in vocational education courses[13,14,17].

When analyzing the distribution of enrollments in the technical nursing courses in the states, the numbers indicate a slight increase in the national scenario. Despite the increase in the number of units offering courses in health – from 51 in 2009 to 113 in 2017[13,14,17] – in the analyzed period, the distribution of technical nursing courses remained almost stable. Among the 26 states and the Federal District, which comprise the Brazilian territory, in 2009 these courses were offered in 13 states, with a concentration in Minas Gerais (6 units)[13]. In 2017, after the most intense period of the Federal Network expansion, the technical nursing course was present in 16 states, with Minas Gerais in the lead, with the course being offered in 10 units. Regionally, the Southeast with 12 units and the Northeast with 11 units have the largest numbers, while the Mid-




**Graph 2.** Number of nursing aides/technicians by period of training and type of educational institution – Public, Private and Philanthropic – Brazil.

Source: PPEB[2]. The authors.

west, with two units, is the region with the lowest rate of offers of technical nursing courses by the Federal Network[17].

Another issue to be raised is that of coverage. Considering that a small number of NA&T/1,000 inhabitants is a good indicator of deficit in the training of nursing aides and technicians, it would be expected that the Federal Network would move to meet these needs. However, that is not what the data show; of the 10 states with the lowest number of NA&T/1,000 inhabitants (Chart 1), only the state of Goiás had two new technical nursing courses at the Federal Network between 2009 and 2017[13,14,17].

What the numbers have shown so far represents the absence of federal institutions in nursing technician training. Considering that the democratization of access to health services necessarily requires the training of professionals who will work in these services, the offer of courses and the increase in vacancies by the Federal Network throughout the national territory are of the utmost importance for universal health coverage and access. Although no studies or justifications were found on the real reasons that lead the Federal Network to have little offer of nursing technician courses, the data show that the public authorities have been neglecting their duty regarding the training of professionals for the health area[18].

## Conclusions

Health care work and, especially, the health care worker has been seen as one of the pillars that enable universal coverage and access to health, but the reality is still far from ideal. The fact is that the current scenario demonstrates the "deep imbalances and gaps in the availability, distribution, composition, competence and productivity of human health resources, especially in primary care"[19]. These distortions occur from different perspectives, but the association between the infrastructure required for the work and the configuration of the health team has a strong influence on the allocation of professionals, i.e., maintaining the installed capacity of health services is one of the determining factors to attract new professionals, preserving regular access to health. Other studies[20,21] carried out in Brazil came to the same conclusion, pointing to the infrastructure of municipalities as a factor for the concentration or dispersion of health professionals, including nurses, nursing technicians and aides. The states of the Southeast region, especially São Paulo, have the highest percentages of job openings in the country, while the seven Northern states together have far less, approximately 8.66% of nursing technician and 4.66% of nursing aide job offers[20].

To aggravate this scenario of distortions, professional qualification has been a social challenge that permeates training for work both at its macro level, characterized by public policies directed to the promotion of the initial professional training, and at its micro level, characterized by the individual's perception about when to improve their knowledge through continuing education.

Not coincidentally, as previous studies[20,21] have shown that São Paulo is the state with the highest percentage of occupied positions in the health area, whereas the states of the North region have the lowest percentage, this scenario is repeated in the training of professionals: of the 1.3 million NA&T represented at PPEB[2], 23.3% graduated in São Paulo. At the opposite extreme, on average the northern region has the lowest percentages, especially the states of Amapá (0.1%), Acre (0.3%) and Roraima (0.5%)[2].

It is also worth remembering that among the strategies for expanding the population's access to health, the World Health Organization highlights the need for strengthening the management of the "development of health human resources with skills that facilitate an integral approach to health"[22]. According to the study published by the Pan American Health Organization (PAHO), Sustainable Health Agenda for the Americas 2018-2030, of the 35 countries that comprise the Americas, by the end of 2015 at least 17 countries had action plans for health human resources in line with the policies and needs of their health service delivery systems. The study found that "on average, there were 48.7 nursing professionals per 10,000 inhabitants in the Americas in 2015. The highest density of these professionals was found in North America – more than seven-fold higher than in Latin America and the Caribbean (110.9 vs. 13.6 per 10,000 inhabitants)"[22].

Considering the analyzed numbers, one can affirm that the reality of the Brazilian municipalities oscillates between profiles that are similar to that of the United States of America and the Caribbean, both regarding the occupation of the job offers, as well as the capacity of training of health professionals. On the other hand, understanding the behavior of professionals when facing the challenge of permanent qualification and, concomitantly, the scenario constructed by the pro-

file of training opportunities, is a path towards the construction of policies aimed at reducing regional inequalities in the training of nursing professionals, a requirement for expanding the qualification opportunities of workers that deal with the life and the health of the population.

Finally, it is worth recalling the role of quality inducer in education that the Federal Network should undertake in health – as it happens in other sectors – almost naturally, due to its national presence and relevance in the process of transformation of the educational scenario, characterized by its capacity to disseminate the culture of excellence and the structuring of continuous improvement cycles, based on innovative actions and policy propositions.

## Collaborations

MCMW Wermelinger, A Boanafina, MH Machado, M Vieira, FRG Ximenes Neto and WF Lacerda, participated in the study conception and design, writing and review of the intellectual content up to the final version of the manuscript.

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