

# A PROFILE OF RESEARCHERS IN CANCEROLOGY WITH PRODUCTIVITY GRANTS FROM BRAZIL'S NATIONAL COUNCIL FOR TECHNOLOGICAL AND SCIENTIFIC DEVELOPMENT (CNPQ)

## PERFIL DE BOLSISTAS DE PRODUTIVIDADE EM PESQUISA DO CNPQ EM CLÍNICA MÉDICA/CANCEROLOGIA

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**Abstract: Objectives:** To examine the profile of research productivity fellows in the área of clinical/cancerology from the National Council for Scientific and Technological Development (CNPq) from 2018 to 2023. **Methods:** Descriptive, cross-sectional and correlational quantitative research. The data were found by researchers with scientific productivity scholarships in clinical medicine/cancerology from CNPq. The results were divided into categories for simple analysis. **Results:** A data search revealed that there are a total of 29 Scientific Productivity Fellows in Clinical Medicine (Cancerology) from CNPq. No representatives were identified in the Senior, 2 and 2F categories among these scholarship holders. Furthermore, there is a predominance of males in most categories. The Southeast region of Brazil holds the majority of productivity grants in cancerology research, representing 65% of the total grants. The majority of researchers, in all regions, stood out for publishing between 7 and 50 articles, with the South region leading with 78%. Researchers from the Midwest had a greater production, exceeding 10 book chapters, representing 17%. **Conclusion:** The majority of scholar ships are 308

concentrated among male researchers and in the southeast region, despite the great productivity of other regions, due to the historical development of the region, with the creation of the first major universities in Brazil and, consequently, greater production of events scientific research and more investment in research to the detriment of many regions. It is suggested to encourage the dissemination of knowledge of the various research produced in the different regions of Brazil, with the holding of more prominent events in the various universities across the country, in addition to encouraging female participation through the existence of gender quotas.

**Keywords:** Oncology; Applied research; Efficiency; Scientific productivity grants; Scientific production indicators.

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## INTRODUCTION

Cancers represent one of the most impactful categories of human diseases, manifesting themselves with several striking clinical characteristics and resulting in millions of deaths annually around the world. The evolution of cancer is a complex process, requiring a comprehensive understanding and a variety of perspectives and approaches to exploit its potential effectively.<sup>[1,2]</sup>

In 2020, it is estimated that there were globally 19.3 million new cases of cancer (18.1 million excluding non-melanoma skin cancer) and almost 10.0 million cancer deaths (9.9 million excluding non-melanoma skin cancer). Despite advances in diagnostic tests and the improvement of antineoplastic treatments, resulting in a constant decrease in disease-related deaths, the search for an effective cure remains challenging. The existing literature on this pathological condition is vast, but a definitive cure remains uncertain. New therapeutic approaches, such as immunotherapy and precision medicine, are being explored in promising studies.<sup>[2,3]</sup>

Oncological research is extensively documented, but its evolution occurs quickly, challenging researchers and clinicians to keep up to date on new information and advances.<sup>[3]</sup> It is crucial to evaluate how funding contributed to the production of educational knowledge in Brazil through researchers. This exercise promotes the discussion about the role of financial support in a scenario and highlights the positions of researchers in the subnational context.

In the context of the various research support initiatives in Brazil, the CNPq offers the modality of Research Productivity Scholarship (PQ) to researchers from various areas of knowledge who stand out in their research activities, being a form of recognition for its exceptional performance among peers.<sup>[4]</sup>

As several studies indicate, CNPq plays a crucial role in the integration of research in Brazil, standing out as one of the main public agencies in charge of promoting academic scientific research. In addition, the CNPQ recognizes researchers from all areas of knowledge who stand out among their peers, granting the modality of Research Productivity Scholarship (PQ) as a form of

recognition for the remarkable research activities developed..<sup>[4]</sup>

The modality of Research Productivity Scholarship (PQ) is hierarchical in six levels (PQ-Sr, PQ-1A, PQ-1B, PQ-1C, PQ-1D and PQ-2), being highly competitive and giving a differentiated status to the researcher, the institution and the research group to which the researcher is linked. CNPq adopts a pyramid-shaped concession, with the base formed by level 2 and the top by level 1A. The Sr (Senior) level is the highest, aimed at leaders highlighted in their areas of activity, requiring that researchers have been PQ scholarship holders or in Technological Development and Innovative Extension (DT) for at least 15 years at levels 1A and/or 1B, or for 20 years at levels 1A, 1B, 1C and/or 1D.<sup>[4]</sup>

In this context, understanding the scientific work of the main researchers in clinical/cancerology makes it possible to establish indicators of progress and advancement in the area of science and technology, in addition to evaluating the impact of this education in professional practice. Thus, this study aimed to examine the profile of productivity fellows in research in the area of clinical/cancerology of the National Council for Scientific and Technological Development (CNPq) in the period from 2018 to 2023.

## METHODOLOGY

The present study was developed as a descriptive, cross-sectional and correlational quantitative research with data from researchers scholarship holders of scientific productivity in medical clinic/cancerology from CNPq. The researchers integrated into the work were those who were listed on the annual lists of scholarship holders on the CNPq website, except for those who had their scholarship interrupted. The data included were from 2018 to 2023.

An instrument was developed to collect information on the Lattes Platform of the CNPq, with the objective of considering fundamental criteria for the understanding of the profile of the most recent researchers in the field of cancerology in Brazil. This motivated the development of this research of the data of the CNPq scholarship holders.

Remarkably, the following data were combined in tables: PQ scholarship category, sex, Brazilian region of origin of the researchers, number of articles published in the last 5 (five) years, number of chapters of books published in the last 5 (five) years and percentage of orientation based on the level of orientation.

The information was analyzed by crossing data related to gender, the Brazilian regions where the research productivity scholarships were allocated and the various categories of scholarships (Senior, 1A, 1B, 1C, 1D, 2 and 2F). The process covered the tabulation of the data and the execution of statistical calculations. After collecting and organizing the data, a bibliographic review was conducted to substantiate and establish relationships between the results, contributing to the

development of the discussion.

## RESULTS

The data survey revealed that there are a total of 29 Researchers Scholarships of Scientific Productivity in Medical Clinic (Cancerology) from CNPq. Notably, no representative was identified in the Senior, 2 and 2F categories among these scholarship holders.

With regard to the category and sex of productivity fellows, as shown in Table 1, there is a predominance of males in most categories. Notably, category 1B stands out with a significant proportion of men, reaching 80.5%, followed by categories 1A, 1D and 1C, with percentages of men of 78%, 69% and 65.5%, respectively. An exception is category 1C, where women represent approximately 34.5%, which is the highest percentage among female researchers. Category 1D is in second place, with 31% of women. Category 1B records the lowest percentage of women scholarship holders, with only 19.5%, marking the lowest index compared to all other categories analyzed. In addition, category 1B has the greatest disparity between male and female researchers, with approximately 80.5% of the scholarship holders being male.

**Table 1:** Scholarship researchers presented by Categories and Gender

Category	Women (%)	Men (%)
Senior	0	0
1A	22	78
1B	19,5	80,5
1C	34,5	65,5
1D	31	69
2	0	0
2F	0%	0%

**Source:** CNPq Lattes Platform ([lattes.cnpq.br](http://lattes.cnpq.br))

As evidenced by the results presented in Table 2, the Southeast region of Brazil emerges as the holder of the majority of productivity scholarships in research in cancerology, representing a significant 65% of the total. The South and Northeast regions exhibit relatively similar proportions of scholarship holders, registering approximately 15% and 10%, respectively. The North region occupies the fourth place in descending order, contributing 6% of the stock exchanges. Last but not least, the Midwest presents only 4% of the research productivity grants in the area of medical clinic (cancerology). It is worth mentioning that, added, the South, Northeast, North and

Midwest regions total 35% of the scholarship researchers, a value that does not exceed the contingent of scholarship holders in the Southeast region.

**Table 2:** Brazilian region of origin of scholarship researchers

<b>Região</b>	<b>%</b>
Southwest	65
South	15
North East	10
North	6
Midwest	4
<b>Total</b>	<b>100</b>

**Source:** CNPq Lattes Platform (lattes.cnpq.br)

In Table 3, the numbers of articles produced by the scholarship holders of scientific productivity in medical clinic/cancerology in the period from 2018 to 2023 were examined, with the data calculated according to the area of activity of the scholarship holder. Notably, the North and South regions did not present candidates who produced between 0 and 6 articles. Most researchers, in all regions, stood out for publishing between 7 and 50 articles, with the South region leading with 78%, followed by the Southeast (75%) and Northeast (68%) regions. The North and Midwest regions showed similar proportions, reaching 56% and 59%, respectively. Specifically, the North region stood out for having the scholarship holders with the highest productivity in the range of 56 to 100 articles, representing 39% of the total scholarship holders in this category. In addition, in relation to the production of more than 100 articles, the North region also led, with 15% of the total number of scholarship holders, followed by the South and Southeast regions, with 10% and 9% of the scholarship holders, respectively. These data reflect the diversity in the productivity of scholarship holders in different regions of the country.

**Table 3:** Quantitative of Articles Published between 2018 and 2023, by region

<b>Region</b>	<b>0-6</b>	<b>7 - 55</b>	<b>56 - 100</b>	<b>&gt;100</b>
Southwest	5%	75%	11%	9%
South	0%	78%	12%	10%
North East	12%	68%	12%	8%
North	0%	56%	39%	15%
Midwest	13%	59%	27%	1%

**Source:** CNPq Lattes Platform (lattes.cnpq.br)

When analyzing Table 4, it is evident that the South region did not have researchers with more than 10 chapters of books published in the period from 2018 to 2023. On the other hand,

researchers from the Midwest presented the highest production, exceeding 10 chapters of books, representing 17%, followed by the North region, which reached 13.5%. The Southeast and Northeast regions stood out for their greater expressiveness in publications from 0 to 4 chapters of books, reaching 82% and 81%, respectively. In contrast, the South region recorded the highest number of researchers with more than 5 chapters of published books. These results suggest significant variations in the production of book chapters between the different regions of the country, reflecting the diversity in the academic activities of productivity fellows in research in medical clinic/cancerology.

**Table 4:** Quantitative of Book Chapters published between 2018 and 2023, by region

<b>Region</b>	<b>0 - 4</b>	<b>5 - 10</b>	<b>&gt;10</b>
Southeast	82%	16%	2%
South	64%	36	0%
North East	81%	16%	3%
North	72,5%	14%	13,5%
Midwest	72%	11%	17%

**Source:** CNPq Lattes Platform ([lattes.cnpq.br](http://lattes.cnpq.br))

## DISCUSSION

The development of studies that address the evolution of pathologies with clinical importance of resolutions still disadvantageous to patients - such as oncological disease - is of great relevance in Brazil, since the updating of new research, especially abroad, is very broad and the progression of the disease is extremely fast. The dissemination of research in the field of medical clinic and cancerology enables progress in the diagnosis, treatment and prevention of this pathology, which is still one of the main causes of death in the world due to the breadth of molecular mechanisms of evolution of neoplasms, of which much of which is not yet fully exploited by science due to the wide variety of subtypes, in addition to the high cost of implementing appropriate treatment for the population.<sup>[5,6]</sup>

However, despite the importance of the elaboration and dissemination of research results and its encouragement among researchers, there is still a very small number of scholarship holders of medical clinic and cancerology productivity in Brazil, according to the results presented, since there are only 29 for an estimate of more than 700 thousand new cases of cancer from 2023 to 2025<sup>[7]</sup>.

In addition, from the results, it is also noted the absence of researchers in the Senior category, which reveals the unsatisfactory character of the research regarding the development of works with visibility and prominence in Brazil by the scholarship holders, since, to fit as a senior, there must be at least 15 years of research in the highest categories in order to obtain such prominence in their area of expertise.

Another factor observed is the great disparity between the percentage of female and male researchers, the former being still quite absent in the productivity scholarships of the category in question. This fact can be associated with gender inequality in the area of medical practice, since 79% of women clinical oncologists receive lower salaries than their male colleagues who perform the same function<sup>[8]</sup>. Therefore, there is little incentive for these professionals to get involved in the branches of research in the area, since there are more difficulties with regard to the favoring of women to carry out their work, either by low wages or by the lack of flexibility and adaptation of workplaces for motherhood<sup>[8]</sup>. This disparity also applies in the world research scenario, of which there is still a great gender inequality among researchers, in which only 28% are women<sup>[9]</sup>. Thus, despite the female effort and increasing their presence in several areas of activity, the female presence in the productivity scholarships is still scarce, either due to the professional difficulties in the area of oncology, and in the lack of female appreciation in science, which encourages in this reduced total number of scholarship holders for this theme that is so broad and with such a need to disseminate the knowledge acquired in order to obtain better prognoses to patients.

It is also noticeable the polarization of the number of researchers in the southeast region, which holds 65% of Brazilian productivity scholarship holders. This factor has been perpetuated for decades, the result of historical developmental processes which have always prioritized the region as a center of industrial and economic growth, leading to its concentration of resources to the detriment of other regions<sup>[10]</sup>. This historical investment in the Southeast, not only in the field of science, but also in the construction of development centers, culminated in the creation of large and valuable universities, which supply research journals with their various works produced. This is illustrated by the great production of reputable and highly disputed universities, such as the University of São Paulo (USP), which concentrated a quarter of the Brazilian scientific production in 2009 and has been maintaining itself as a great producer of knowledge in the main journals of the country<sup>[11]</sup>.

The polarization of investment and recognition of the Southeast region generates a low incentive in obtaining new researchers from other Brazilian regions, which, despite the continuous development in several spheres in recent decades, suffers mainly from the lack of resources, which promotes the lack of engaged researchers and, consequently, this reduction in the number of productivity scholarship holders in research in medical clinic and cancerology.

Despite the adversities, the productivity of the existing scholarships in the various regions is remarkable, because, even with the existing disparity in the number of researchers in each locality, the production of scholarship holders in regions less contemplated by resources is very high, as mentioned in table 3. In addition, the variation in the number of book chapters between the regions, with several productions among the scholarship holders of medical clinic and cancerology, especially with more than ten chapters in the north and midwest regions also reveals the effort in the generation of content and the scientific contribution present in these regions, being very positive for the country its studies in the various regions in order to obtain a more integral knowledge about this topic as broad as cancerology.

What generates the ambiguity between production, number of researchers and classification of these in levels regarding productivity is certainly the aforementioned polarization of the academic centers in the south and southeast regions, which thus have more scientific events for the dissemination of knowledge and, consequently, greater recognition of their works, which are now evaluated more qualitatively<sup>[12]</sup>. This response to the production of poorly recognized works to the detriment of the south and southeast regions contributes to the reduction of the incentive of the emergence of new researchers, and there should also be interventions in this sector.

## CONCLUSION

In summary, despite the low number of scholarship holders, its gender polarization and the greater number of researchers in the southeast region, there is vast scientific production on the subject in Brazil in a varied way throughout the territory. However, greater incentives are needed to obtain more researchers, with the creation of more productivity grants and greater recognition as quotas by gender in order to encourage the female presence in this research theme.

It is necessary to greater dissemination of the knowledge produced by the various regions of the country, such as North and Midwest through the realization of more events that prioritize the work produced in these regions in order to expand the research results to professionals in the areas of medical clinic and cancerology.

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