Gender Gaps and the Gender Parity Index in Research in a Colombian Region

Isabel Cristina Rivera-Lozada *, César Antonio Bonilla-Asalde, Oriana Rivera-Lozada *

Posted Date: 27 March 2025

doi: 10.20944/preprints202503.2036.v1

Keywords: gender rights; gender parity; research

Article

Gender Gaps and the Gender Parity Index in Research in a Colombian Region

Isabel Cristina Rivera-Lozada [1,*], César Antonio Bonilla-Asalde [2] and Oriana Rivera-Lozada [2,*]

[1] University of Cauca

[2] Señor de Sipán University

[3] Graduate School of the Señor de Sipán University

* Correspondence: irivera@unicauca.edu.pe (I.C.R.-L.); riveraolozada@gmail.com (O.R.-L.)

Abstract: Given the difficulty of measuring gender gaps in STI and research due to access to comparable information, this research aimed to measure the gender gap in research and the Gender Parity Index for the Department of Cauca, Colombia, in the calls for proposals for Minisciences 2013-2021. This approach is unique to date. The goal of the mixed-methods approach was to determine the gender parity index (GPI) and the gender gaps in research in four fundamental aspects: research area, level of training, classification of researchers and age groups. The results of the measurement were contrasted with the perceptions obtained from a focus group composed of recognized researchers from the region. The triangulation of the information indicates that the gender gaps are high and the GPI is low, whereas the researchers do not perceive the existence of the gaps, a situation that is detected in the field of administrative management and the scarcity of financial resources for research.

Keywords: gender rights; gender parity; research

1. Introduction

The economic growth of Latin America and the Caribbean (LAC) in 2024 was 2.2%, and 2.4% is expected for 2025 because of low economic activity and stagnation of international GDP (ECLAC, 2024)., This provides a scenario for science, technology and research (STI) to play an important role in the socioeconomic development of the region, particularly if the gender gap in STI is reduced, which in LAC is 30% (World Economic Forum, 2017; López-Bassols et al., 2018). The Global Gender Gap Report (World Economic Forum, 2023) indicates that it will take the region 67 years to achieve gender parity, which is 72.6%, and in the case of Colombia, it is 71% in 2022, which is lower in relation to the previous year, which was 72%, but it went from occupying position 59 to 75 in the ranking that considers 155 countries (Datosmacro, 2022). In Colombia, 39% of the researchers recognized by the Ministry of Science, Technology and Innovation MinCiences (2021) are women, 51% (4,314) have doctoral training, and 67% are recognized as junior researchers. In Cauca, a department in southwestern Colombia that contributes 1.76% of the national GDP (DANE, 2023) and is directly affected by armed conflict (Colprensa, 2023), 1.56% of the country's researchers and female researchers constitute 37% of the total (Minciencias, 2021).

The difficulty in measuring gender gaps in STI, especially in research, has been recognized (Rivera-Lozada IC et al., 2023; Monroy, 2019; Tacsir et al., 2014); specifically, accessing international comparability information is difficult. Despite this, this research aimed to measure the dimension of the gender gap in research, as well as the Gender Parity Index for the Department of Cauca, Colombia, in the period of 2013-2021 to demonstrate the research situation regarding the achievement of gender parity and the closing of gaps, as well as accurate information for public policy-makers to make relevant decisions and propose the necessary interventions to achieve this Sustainable Development Goal as well as regional socioeconomic development.

 doi:10.20944/preprints202503.2036.v1

2. Materials and Methods

A mixed quantitative and qualitative approach was used for this research. The quantitative component consisted of the gender parity index (GPI) and the gender gaps of researchers in the Department of Cauca in terms of research area, level of training, classification of researchers and age groups.

The information was extracted from the database of the free platform MinCiencias https://minciencias.gov.co/la-ciencia-en-cifras/, where the information of the Department of Cauca (Pacific region) and the data of the researchers in the calls for the years 2013-2015, 2017, 2019 and 2021 are all available. The data obtained offered information on the research area, specialty area, classification, level of training, age, region, place of birth, place of residence and institution, among others.

The study population consisted of 1024 researchers classified in the calls of MinCiencias in the Department of Cauca during the years 2013-2021 (2013: 109; 2014: 89; 2015: 116; 2017: 153; 2019: 227; 2021: 330). The information was collected in Microsoft® Excel® for Microsoft 365 MSO (version 2310 compilation 16.0.16924.20054) of 64 bits, analyzed in SPSS software version 21.0 and available in the open access repository ZENODO (https://doi.org/10.5281/zenodo.10287705).

The descriptive analysis of the data included frequencies and the gender parity index (GPI) to evaluate gender differences in the sciences (natural, engineering and technology, medical and health, agricultural, social and humanities), the level of training (undergraduate, medical specialty, specialization, master's degree, doctorate and postdoctorate) and the classification of researchers (junior, associate, senior and emeritus). The GPI was obtained by dividing the value of an indicator for women by that for men (Koronkiewicz, 2017).

$$\text{GPI} = \text{indicator value women}/\text{indicator value men}$$

A value less than one (1) indicates differences in favor of men, whereas a value close to one (1) indicates that parity has almost been reached. A value greater than one (1) indicates differences in favor of women.

Likewise, the gender gap was calculated by adjusting the formula proposed for the effective wage gap (Angle, 2022); for this purpose, the difference in the values of men and women was calculated, and the figure was divided by the value of men. The result is multiplied by 100 and is the percentage known as the gender gap.

$$\text{Gender gap} = (\text{indicator value men} - \text{indicator value women})/\text{indicator value men}$$

The goal of the qualitative component of the research was to contrast the perceptions of researchers from Cauca regarding the limitations to achieve gender parity and gender gaps in research in the Department. For this purpose, a semistructured interview was conducted and conducted with six researchers—three women and three men—all from the public university of the region and with high-quality accreditation, doctorate and research experience.

This study was approved by the ethics committee. The participants in this study provided informed consent, and their identities were anonymous so that their integrity was not violated.

3. Results

3.1. Gender Gap and Gender Parity Index in Research in the Department of Cauca 2013-2021

3.1.1. Sciences

In Colombia, the Ministry of Science classifies scientific areas in accordance with the provisions of the Organization for Economic Cooperation and Development (OECD) in natural sciences, engineering and technology, medical and health sciences, agricultural sciences, social sciences and humanities (OECD, 2007).

 doi:10.20944/preprints202503.2036.v1

The results indicate that the medical and health sciences are the area that is closest to parity (0.87), closely followed by the social sciences (0.75); however, curiously, the humanities (0.18) and engineering and technology (0.32) are the ones that present the lowest parity on average, that is, fewer women researchers in the calls for the study period 2013-2021. With respect to the gender gap, humanities has the largest gap (81.58%), followed by engineering and technology (67.7%); the smallest gap is in medical and health sciences (13.33%), accompanied by social sciences (25.19%), which is consistent with the GPI (Table 1). Associating Natural Sciences with Engineering and Technology, we can approximate the gender gaps in research in science, technology, engineering, and mathematics (STEM) in the Department of Cauca, where the results indicate a gap of 55.64% and an IPG of 0.44.

Table 1. Gender Gap and Gender Parity Index in Sciences, Department of Cauca 2013-2021.

Sciences	IPG	Gap
Natural	0.56	43.58
Engineering and Technology	0.32	67.70[1]
Medical and Health	0.87	13.33
Agricultural	0.57	42.86
Social	0.75	25.19
Humanities	0.18	81.58
Steam	0.44	55.64
Total	0.54	45.71

In the case of natural sciences, there was a greater number of male researchers in all calls, which is consistent with the gender gap for the period, 43.58%, and the GPI of 0.56 (Table 1).

In engineering and technology, the gender gap in the 2013 call was 78.95% and was attenuated at the end of the calls when it was 57.87%, below the national gap in electronic engineering, 73% (Figueroa Vergara, et al., 2023). During this period, the GPI was 0.32, and the gender gap was the second highest, at 67.7%.

Regarding medical and health sciences, the figures indicate that in the first call (2013), there was no gender gap in participation in research. During the subsequent eight years, the number of female researchers exceeded their male counterparts by 12%, a situation that can be explained by the greater number of women who practice in this field of knowledge, as well as the greater collaborative participation in research, a situation that is reflected in the gender gap that is 13.33%, the lowest of the sciences classified for this analysis and the highest GPI of 0.87.

In the first call for the classification of researchers (2013), the number of female researchers in agricultural sciences in the department of Cauca had a ratio of 2:1 with respect to male researchers, a situation that was quickly lost in the two following calls (2014 and 2015), as the number of researchers remained constant and one researcher lost classification in the 2017 call. Thus, in the last calls (2018 and 2021), there was an increase in the number of researchers that was insufficient to reduce the gap between researchers in agricultural sciences, which was 42.86%, and the GPI (0.57).

The area of social sciences has drawn attention because it has the second lowest gap, 24.19%, and the highest GPI, 0.75, in a field of knowledge that historically has higher female participation, although with male authority (UNAM Gazette, 2021). Despite having a zero gap in the 2014 call, the growth trend in the number of researchers did not manage to reduce the gap that was accentuated in the last call.

In the field of humanities, the absence of female researchers is significant; in three periods (2014, 2015 and 2017), there were no female researchers registered, leading to this being the field of knowledge with the greatest gender gap in Cauca, with 81,58% and the lowest GPI, 0.18, a situation that contrasts with the number of women in the humanities, which in Colombia is 74.5% (LEE, 2023).

 doi:10.20944/preprints202503.2036.v1

3.1.2. Researchers' Classification According to Mimetics

MinCiencias classifies researchers into four categories: junior, associate, senior and emeritus. Cauca represented 1.56% of the national researchers (Figure 1). In the junior category, there is the greatest number of researchers and therefore the lowest gender gap, 32%, and the highest gender parity index (0.68) (Table 2).

Table 2. Gender gap and gender parity index in the classification of researchers from 2013-2021.

Classification	IPG	Gap
Junior	0.68	32.45
Associate	0.28	71.77
Senior	0.07	92.59
Emeritus	0	0.00
Total	0.26	49.20

The results show that in the Emeritus researcher classification, the gender gap is 0% because the GPI is 1 because there are equal numbers of male and female emeritus researchers in Cauca (Table 2).

With respect to the associated research classification, despite the growing trend in the number of researchers, the gender gap is 71.77%, and the GPI is low (0.28), considering that there is greater participation of researchers in this category.

The senior researcher classification has low participation in Cauca, and the first three calls lack registration for researchers, which is reflected in a large gap of 92.59% and a low GPI (0.07) (Table 2).

The highest investigative classification, Emeritus, lacks the participation of both men and women during the period 2013-2015, a situation that changes in the year 2017 and that registered the participation of a female researcher disappears a year later to appear again in the last call. of the year 2021 next to a researcher, a situation that explains the result of total parity (GPI: 1) and the absence of a gender gap of 0% (Table 2).

3.1.3. Training Level

MinCiencias classifies the level of training into seven categories: other, undergraduate, medical specialty, specialization, master's degree, doctorate and postdoctoral studies. The Department of Cauca does not register researchers in the other category, and the highest gender gap (82.76%), accompanied by the lowest GPI (0.17), is found in the medical specialty category, and the highest GPI (0.88), with the lowest gender gap of 12.5%, is found in the group of researchers with a specialization level of training (Table 3).

Table 3. Gender gap and gender parity index at the level of training of researchers from 2013-2021.

Training level	IPG	Gender gap
Undergraduate	0.5	50.00
Medical specialty	0.17	82.76
Specialization	0.875	12.50
Mastery	0.79	21.32
PhD	0.38	62.07
Postdoc	0.31	68.97
Total	50%	49.60

3.1.4. Age Group

Five age groups— 20-29, 30-39, 40-49, 50-59 and 60-69—were analyzed. Generally, across all analyzed calls, there were few recognized researchers in the youngest range of 20-39 years, as well as

 doi:10.20944/preprints202503.2036.v1

in the highest range of 60-69 years (Graph 13). The largest gender gap, 74.51%, and the lowest GPI, 0.25, were in the age range of 60-69, in contrast to the smallest gender gap, 15%, and the highest GPI, 0.8, which were in the youngest range of 20-29 (Table 4).

Table 4. Gender gap and gender parity index by age group in researchers from 2013-2021.

Age group	IPG	Gender gap
20-29	0.8	15.0
30-39	0.73	23.73
40-49	0.37	61.25
50-59	0.60	41.09
60-69	0.25	74.51
Total	0.55	43.11

The results show that the youngest group, 20-29, did not exceed ten researchers, as was the case with the 60-69 range. During the 2013-2015 period, the most representative age range among the researchers was 40-49 years, a range where the gender gap was 61.25% and the GPI was 0.37.

3.2. Perception of the Gender Gap, Voices

In contrast to the gender gap and the calculated GEM, the researchers interviewed do not perceive the existence of a gender gap in the research or in the field in which they operate. The interviewees were hermetic on the subject, and when questioned, the H1 researcher stated about his latest research "this last one [...] we did it with almost 30 teachers, there was a high participation of teachers and monitors, I do not remember exactly the figure," but I think it was predominantly women, for example, here in the department, the only man was me".

For her part, researcher M1 did not hesitate to affirm that "I have not felt it, I am in the research group for rural development, let's say at this moment we are men and women, it is almost equal"; however, she stated that it was always like this, noting, "when I entered, the majority were men, I was almost the only woman, but as time has passed, the number of women in the group has increased and there is still no gender discrimination for the projects". This is not surprising because the participation of women in research increases with each call, although in a lower proportion than that of men researchers (Minciencias, 2021).

Researchers H2 and H3 perceived the existence of inequality in research, especially in the field in which they operate. H3 stated, "No, in our faculty, there are many fewer women doing research, but it comes generally from the discipline, from the discipline. If one analyzes the number of women versus men historically (…) in fact, in this semester it is curious, because I am 35, there are only two women ", evidencing the recognition of male predominance. H2 expressed, "Well, it is a tradition, right? "The system is terribly androcentric. (…) If you take a historical tour, you will see that when women come to the surface, it is not because they were not there; it is not because they had not been thinking that they had not been studying at the University but because it was an official policy of invisibility. (…) It is a tradition that still costs a lot. It costs a lot because if it is not for quota laws and quota requirements, for compensatory measures, women would not be recognized yet ".

Most of the researchers were more hermetic on the subject; M1 did not hesitate to affirm "I have not felt it, I am in the research group for rural development, let's say at this moment we are men and women, it is almost equal". This perception highlights queen bee syndrome, where women are opposed to feminist movements and consider that professional success is due to their own effort and merit and not to the societal system, which leads them to surround themselves with men (Staines et al., 1974). M2 had a similar perception, affirming, "I believe that we were like equal. (…) There it is more or less balanced. (…) Although yes, one can see many, many women leading research projects "; however, M1 stated that it was not always like this" when I entered, the majority were men, I was almost the only woman, but to the extent time has passed, the number of women in the group has increased and there is still no gender discrimination for the projects ", a situation that is not surprising

 doi:10.20944/preprints202503.2036.v1

because the participation of women in research increases in each call, although to a lesser extent than that of men researchers (MinCiencias, 2021). Only one of the researchers interviewed perceived the gender gap: M3 stated, “In research, creation, hey, I feel that in this field, the university is much more patriarchal, right? And as research is done within the university, because there are fewer researchers because there are fewer women, in my view, within the alma mater”.

Although the researchers agreed that they did not perceive the gender gaps associated with discrimination, when asked about aspects of reconciliation between research processes and family life, opinions diverged. Researcher M1 pointed out how the care of her child in childhood impacted her work development: “When my child was small, that affected me a lot because it took time away from my child so sometimes I had to take him to the field on a Saturday and it is not that he really likes what his mother does for work; then both he and I because I said that he had to do something that he does not like [...] I had to work much more at night and less on the weekend in graduate work and research, to be able to dedicate more time to him”.

M2 expressed, “I am the mother of an 11-year-old boy. So, when I started my doctorate, he was very young. […] I had a pandemic doing my doctorate. It was so hard, because my son in class was very young, looking out for him. So, for me it is a thing that must be balanced. But it is not easy, it does not seem easy to me. Like to say, well, this is my time to investigate." Researcher M3 did not discuss this aspect of her life in detail.

Researcher H1 acknowledged that, as a man, he did not face many difficulties due to the traditional division of roles in patriarchal society, noting, "my productivity at this moment is on the rise, again, but it was impossible ten years and more if we are talking of women, as we are in patriarchal societies, so many of the household tasks are assigned to women only because they are women, men are not, so men in that situation can still investigate more than women; for example, women have to breastfeed, men don't, so we don't have to dedicate time to that task, so men, even though we are with young children, have an advantage over our partner”.

Her voice draws attention to the aspects of reconciliation between work and family life, especially in aspects related to care that men and women resolve differently. In the case of women, the voice of researcher M1 spoke of sacrificing time, both leisure and work, to attend to maternal responsibilities to the detriment of research productivity; this affected her professional development. However, now that her son is an adult, she has more time and can make progress in her research, as she noted, “but now that he is an adult, on the contrary, research becomes a better entertainment, because I am dedicated 100% to the university, let us say, […], sometimes a week It is difficult for me to visit the fieldwork of a student so I do it on a Saturday, I have no problem with that”. Faced with the same situation, Researcher H1 realized the greater flexibility of his schedule to allocate it to the investigation: “On my normal days, I am finishing at 9 at night and I have started, I have class at 7 am, then we are talking approximately 12,14 hours a day, well removing the noon break,” a situation that highlighted contrasts with his counterparts through the recognition of the additional challenges that women researchers face.

H3 recounted details of his investigative process compared with that of his ex-wife: “My ex is also a researcher, a professor at the university. […] Obviously, then, because she was the mother, then obviously she had to sacrifice much more than me. […] But there is always a recrimination, because I could do more things than she. So, I could travel, they accepted articles and she did not. […] I think it is more training, because obviously, well, in the care of our son, we were both, but the decision was, for example, […] the opportunity arose to go to Germany then, she decided to finish his doctorate in a virtual way and I as if I could be in Germany so I could have better conditions to develop my doctorate (…) in fact, he once told me, as he always felt under my shadow ”. H2 stated, “Well, maybe starting, no, then yes, I think it is more difficult for parents, in adolescence. For mothers more in childhood, because we are very busy at the end of the social life of boys, there are many parties at all times, friends, outings and trips, which is their social life; it ends up reducing the intellectual life of us”.

 doi:10.20944/preprints202503.2036.v1

H3 also explained that the extra time that he dedicates to research "generally always exceeds that dedication of 40 hours, especially for activities that are in favor of the projects that are had, for example, formulating a project, because I do not have within my work time for that, so, well, I dedicate extra time for that". H2 confirmed that "the morning (it is outside of my working day, I am at night) is for the second manifestation that I was telling you, the products we make without the academic hour, right? That it has to do with reflections, with some book projects that we do with groups from other countries or from here ", available time that the researchers do not have because it intersects with the care tasks that still end up being mostly their responsibility.

Regarding the difficulties identified to investigate, Researcher M1 referred to those related to public order to conduct field work. Notably, the Department of Cauca is a territory in Colombia with a greater presence of various armed actors, so the researcher affirms that "the first difficulty is public order because I have worked in areas with difficult public order; we work in the Tambo where there was no difficult situation only with the guerrillas but also with paramilitaries." Although this situation affects men and women, it does not affect them in the same way, as women face greater vulnerability and exposure to security risks.

For the H1 researcher, the main difficulty for the research exercise is the limitation of resources: "well, the first and most obvious is the one that always happens, it is the lack of financial resources […] lately we have had problems with the administrative part of Right here in the university, […], people have to work for free or there are resources to pay for work but also for economic stimuli and those economic stimuli do not reach the professors so we practically do research for free". H3 agreed, stating, "In general, I would say financing. However, that is, financing can be sought, but it is difficult, that is, let's say, you apply to ten proposals out of the 10 you get one or two, it involves a lot of work, let's say, to be able to find resources." H2 mentioned that the main difficulty is the predominant interest of the institutions in some disciplines more than others: "there is still a contempt and a kind of mistreatment of the human and social sciences, the arts and some expressions that within the profession are not very conventional like accounting ".

The group of researchers denounced the same difficulties related to the administrative management of research projects. M1 expresses that "the other serious problem and that is the reason why I did not return to lead projects where the university is the one that manages the budget, it is the administrative management with the university, it is very cumbersome, […], there is a lot of bureaucracy, I understand that there must be a transparent management of resources, but sometimes it becomes like a chore to not be able to do the processes".

M2 supported the above: "Let's say, look, the legalization part. Because one wants to do, for example, investigations, but until the entire process of the vice-rectory is complete, it is as if it did not exist." Moreover, M3 noted, "Difficulty in which I tell you, the part of resources is not easy to obtain and for investigating in the field requires a lot of resources." This is tied to GDP (López-Aguirre and Farías, 2022).

4. Discussion

In Latin America and the Caribbean, the participation of women in research ranges between 30% and 60% (López-Bassols et al., 2018.), a situation that is consistent with the results found for the Department of Cauca, Colombia, which has a gap of gender in the investigation of 45.7%. The gender gap in research in the field of medical and health sciences is the lowest, at 13.3%, in accordance with their high degree of participation in this field (López-Bassols et al., 2018; Monroy, 2019). The results indicate that in Cauca, the gender gap in STEM is 55.64%, despite the higher proportion of female graduates in science, 56.3%, offset by the lower number of graduates in technology careers, 20.3% (LEE, 2023). With respect to engineering and technology, the gap is greater than that with STEM, at 67.7%, which highlights the discipline with the greatest degree of gender asymmetry.

In the field of social sciences, the results show a gender gap of 25.19%, which may be a reflection of the significant participation of women in this field (UNAM Gazette, 2021) but contrasts with the greater gap in the field of humanities, with 81.58% of women being more underrepresented. With

 doi:10.20944/preprints202503.2036.v1

respect to the field of agricultural sciences, the situation of the GPI of 0.57 shows greater gender parity in research in this science despite the greater roots in gender stereotypes in this sector (DANE, 2020).

This study also examines the classification of researchers in Colombia according to MinCiencias. In Cauca, there is a growing trend in the number of researchers who apply to be classified; therefore, the highest GPI in the classification of researchers is in the junior category, a situation that reflects the greater incursion of women in research in contrast with the low percentage of female researchers in the world, 28% (UNESCO, 2019). With respect to the senior classification, the number of researchers classified in the calls was low, which explains the large gap, 92.59%, indicative of the progressive and recent incursion of the researchers in the classification processes that are still opening trials (González García, 2017; Ortmann, 2015).

Despite the significant academic offerings of the country in terms of postgraduate degrees (Gutierrez Ossa et al., 2019), the gender gap in the level of training of Cauca researchers is far from closed, at 45.71%. In the case of medical specialties, the gaps are significantly greater, at 82.76%, in a disciplinary field with a greater number of women.

The gender gap in research in Cauca in terms of sciences is 45.71% according to the classification of researchers (49.2%), by the level of training (49.6%) and by the age group (43.11%), which is quite high in terms of consideration to the 5% reference to assess gaps in Ibero-America and is within the framework of the most accentuated national gaps in the region (Albornoz et al., 2018).

Despite the gender gap in high research and low GPI, the researchers interviewed did not immediately perceive it as a concern. It was necessary to ask specific questions so that differential difficulties due to gender for research performance emerged. Moreover, they coincided in pointing out the precarious administrative management needed to support investigative work. In this regard, the impact is surely different and greater for researchers who lack time, although this research did not seek to confirm this situation because it exceeded the scope of this research.

The results indicate that sexism and gender inequality need to be made visible in the research community as part of the actions that contribute to closing gaps, as well as measures aimed at reconciling professional and family life (Ordorika, 2015; Peru Domínguez, 2021) that enable female researchers to increase scientific productivity, as stated by the interviewees, and to shorten the productivity gaps with their male counterparts (Araneda et al., 2023).

The limitation of the present study is the methodological design of the quantitative component, which did not allow us to observe causal relationships. Despite this, the research met the objective of measuring the gender gap in research, as well as the gender parity index in the region of interest, which provides evidence for subsequent studies that deepen and broaden the subject.

5. Conclusions

The gender gap in research in the Department of Cauca is high both in various disciplines and in the level of training, research classification and age groups, a situation that is also reflected in the Gender Parity Index, which is low. In particular, in the medical and health sciences, these indicators present better results because of the high participation of women in this discipline. Despite the above, the high participation of women professionals in the humanities has not yet reached gender parity.

In the field of STEAM, gender parity is still far from being reached, particularly in the component related to engineering and technology, which increases the gap; however, there is a regional academic offer of training programs in this field.

There is a growing trend in the number of researchers in the last calls, which is reflected in the GPI of the junior classification, which is high, whereas it is low in the Associate and Senior classification. With respect to the level of training, gender gaps in research are more closely related at the level of specialization, perhaps because training requires less time for dedication with respect to the master's, doctorate and postdoctoral degrees, which allows for better reconciliation with care tasks, which are traditionally recharged by women.

Finally, the perceptions of the researchers interviewed indicate that the participation of women in research, gender parity and the closing of gaps is not a problem on their agendas and that they

 doi:10.20944/preprints202503.2036.v1

reach it only when they are questioned about it. A more immediate concern is related to the financing and management of research resources than those situations conditioned by societal paradigms that maintain gender stereotypes and make it difficult to reconcile care and research in this case.

Supplementary Materials: The following supporting information can be downloaded: ZENODO (https://doi.org/10.5281/zenodo.10287705) (base of tasoa.

Author Contributions: Conceptualization, ICRL, CABA. and ORL. ; methodology, ICRL, CABA and ORL. ; software, ICRL and ORL. ; validation, ICRL, CABA. and.ORL; formal analysis, ICRL and ORL. ; investigation, ICRL, CABA and ORL. ; resources, . ICRL, CABA. and ORL; data curation, ICRL, CABA. and ORL. ; writing — original draft preparation, ICRL, CABA. and ORL. ; writing — review and editing, ICRL, CABA. and ORL. ; visualization, ICRL, CABA. and ORL; supervision, ICRL, CABA. and ORL. ; project administration, ICRL, CABA. and ORL. ; funding acquisition, ICRL, CABA. and ORL. All the authors have read and agreed to the published version of the manuscript.

Funding: Please add: "This research received no external funding".

Institutional Review Board Statement: “Not applicable” since the information comes from the database of the free platform MinCiencias https://minciencias.gov.co/la-ciencia-en-cifras/.

Conflicts of Interest: The authors declare no conflicts of interest.

References

(Harwood 2008) Harwood, John. 2008. Title of the Cited Article. Available online: URL (accessed on Day Month Year) Albornoz, M., Barrere, R., Matas, L., Osorio, L., & Sokil, Y. J. (2018). 2.1 Las brechas de género en la producción científica iberoamericana. Retrieved November, 28. https://datos.bancomundial.org/indicador/SP.POP.TOTL.FE.ZS

Araneda-Guirriman, C., Rejas, L. P., & Sepulveda-Paez, G. (2023). Brechas de género en la productividad científica: una aproximación desde Chile. Pensamiento Educativo, 60(1). https://doi.org/10.7764/PEL.60.1.2023.7

CEPAL. (2024). Balance Preliminar de las Economías de América Latina y el Caribe, 2024. https://repositorio.cepal.org/entities/publication/821e7277-e637-49be-a979-9cb12ac26670

Colprensa. (2023). La nueva crisis del Cauca: la violencia como mecanismo de presión | Cambio Colombia. https://cambiocolombia.com/conflicto-armado-en-colombia/la-nueva-crisis-del-cauca-la-violencia-como-mecanismo-de-presion

DANE. (2020). Situación de las Mujeres Rurales en Colombia. moz-extension://c108e0c6-8984-454d-8be5-cce8a44c417a/enhanced-reader.html?openApp&pdf=https%3A%2F%2Fwww.dane.gov.co%2Ffiles%2Finvestigaciones%2Fnotas-estadisticas%2Foct-2021-nota-estadistica-situacion-mujeres-rurales-colombia-resumen.pdf

DANE. (2023). DANE - Cuentas nacionales departamentales: PIB por departamento. https://www.dane.gov.co/index.php/estadisticas-por-tema/cuentas-nacionales/cuentas-nacionales-departamentales

Datosmacro. (2023). Colombia - Índice Global de la Brecha de Género 2023. https://datosmacro.expansion.com/demografia/indice-brecha-genero-global/colombia#:~:text=Colombia tiene una brecha de género del 71%25

Figueroa Vergara, A., Valero, W., Rodríguez, E., Franco, J., Villamil, E., & Durán, D. (2023). Tránsito de la Educación Media a la Educación Superior: análisis comparativo del periodo 2016-2021. Educación Superior en cifras, 2. moz-extension://c108e0c6-8984-454d-8be5-cce8a44c417a/enhanced-reader.html?openApp&pdf=https%3A%2F%2Fsnies.mineducacion.gov.co%2F1778%2Farticles-416753_boletin_jul_2023.pdf

Gaceta UNAM. (2021). El rol de la mujer en las ciencias sociales. https://www.gaceta.unam.mx/el-rol-de-la-mujer-en-las-ciencias-sociales/

 doi:10.20944/preprints202503.2036.v1

González García, M. I. (2017). Ciencia, tecnología y género. http://repositorio.conacyt.gov.py/handle/20.500.14066/4262

Gutierrez Ossa, J. A., Mondragón Morales, V. H., & Montenegro, L. C. (2019). Expectativas, necesidades y tendencias de la formación en educación superior en Colombia en pregrado y posgrado: entre la deserción–perfil y vocación profesional. Revista Universidad y Empresa, 21(37), 313–345. https://doi.org/10.12804/REVISTAS.UROSARIO.EDU.CO/EMPRESA/A.6619

Informe análisis estadístico LEE. (2023). Las mujeres son minoría en las carreras STEM. moz-extension://c108e0c6-8984-454d-8be5-cce8a44c417a/enhanced-reader.html?openApp&pdf=https%3A%2F%2Fwww.javeriana.edu.co%2Frecursosdb%2F5581483%2F8102914%2FInforme-67-Mujeres-en-STEM-9feb2023-LEE.pdf

Koronkiewicz, M. (2017). Gender Parity Index. https://web.archive.org/web/20171117223020/http://www.unescobkk.org/fileadmin/user_upload/aims/Pattaya_SCB_Jun05/Gender_Parity_Index_-_Michael_Koronkiewicz.pdf

López-Aguirre, C., & Farías, D. (2022). The mirage of scientific productivity and how women are left behind: the Colombian case. Tapuya: Latin American Science, Technology and Society, 5(1). https://doi.org/10.1080/25729861.2022.2037819/SUPPL_FILE/TTAP_A_2037819_SM6283.PDF

López-Bassols, V., Grazzi, M., Guillard, C., & Salazar, M. (2018). Las brechas de género en ciencia, tecnología e innovación en América Latina y el Caribe: resultados de una recolección piloto y propuesta metodológica para la medición. En Banco Interamericano de Desarrollo. Inter-American Development Bank. https://doi.org/10.18235/0001082

Minciencias. (2021). Investigadores reconocidos por Colciencias | Minciencias. https://minciencias.gov.co/la-ciencia-en-cifras/investigadores

Monroy, M. L. (2019). La sociedad del conocimiento y las brechas de género en ciencia, tecnología e innovación. Cuadernos Latinoamericanos de Administración, 15(29). https://doi.org/10.18270/CUADERLAM.V15I29.2871

OCDE. (2007). Revised field of Science and Technology (FOS) classification in the Frascati manual. https://www.oecd.org/science/inno/38235147.pdf

Ordorika, I. (2015). Equidad de género en la Educación Superior. Revista de la educación superior, 44(174), 7–17. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-27602015000200001&lng=es&nrm=iso&tlng=es

Ortmann, C. (2015). Mujeres, ciencia y tecnología en las universidades: ¿la excepción a la regla? Revista del IICE, 38, 95–108. https://doi.org/10.34096/RIICE.N38.3465

Peru Domínguez, O. (2021). Prestaciones para la conciliación de la vida laboral y familiar: una revisión de su diseño e impacto en los países de la OCDE. Revista de servicios sociales, 74, 33–54. https://doi.org/10.5569/1134-7147.74.02

Rivera-Lozada IC, Escobar GC and Rivera-Lozada O. (2023). Gender gaps in research: a systematic review [version 1; peer review: awaiting peer review]. F1000Research 2023, 12:1302 (https://doi.org/10.12688/f1000research.140694.1)

Staines, G., Tavris, C., & Jayaratne, T. (1974). The queen bee syndrome. The female experience. Del Mar, California: CRM Books.

Tacsir, E., Grazzi, M., & Castillo, R. (2014, febrero 11). Women in Science and Technology: What Does the Literature Say? Inter-American Development Bank, 29. https://publications.iadb.org/en/women-science-and-technology-what-does-literature-say

UNESCO. (2019). Descifrar el código:La educación de las niñas y las mujeres en ciencias, tecnología, ingeniería y matemáticas (STEM). https://unesdoc.unesco.org/ark:/48223/pf0000366649/PDF/366649spa.pdf.multi

 doi:10.20944/preprints202503.2036.v1

World Economic Forum. (2017). The Global Gender Gap Report 2017. moz-extension://c108e0c6-8984-454d-8be5-cce8a44c417a/enhanced-reader.html?openApp&pdf=https%3A%2F%2Fwww3.weforum.org%2Fdocs%2FWEF_GGGR_2017.pdf

World Economic Forum. (2023). Global Gender Gap Report 2023. https://es.weforum.org/publications/global-gender-gap-report-2023/digest/