



Research Paper

Factors which hinder the scientific labor of female researchers within the SNI

Accepted 6th August, 2020

ABSTRACT

Nowadays, we live in a society where science is presented under social and dichotomic stereotypes; where women have not had the same opportunities as men. Nevertheless, Mexican women have slowly broken certain dichotomies and stereotypes related to gender stereotypes, and they have also demonstrated their great dexterity, skill and knowledge they have ventured into postgraduate studies, administrative jobs, scientific disciplines and research centers. They have also gained access to the National System of Researchers (in Spanish: Sistema Nacional de Investigadores or SNI), an institution which symbolizes quality and prestige of the Mexican scientific contributions. Taking this into account, the following research was carried out under the quantitative paradigm, it is a descriptive research and it uses an empiric-analytic approach. Its purpose is to know the current situation of the female researchers within the SNI. The sampling consists of 184 people, ranging from 30 to 72 years old, with an average of 44.94 years old; the mode was 40 years old. The data was collected via the survey. To carry out the analysis, the Statistical Package for the Social Sciences (SPSS version 24) was used. Among the most important general data of the research, it was found that 60.8% of the researchers are in level 1 within the SNI, and the majority of them are in Discipline IV (Human and Social Sciences) with 35.8%; 47.8% of the women answered that they Sometimes feel discrimination toward their scientific job. The main factor which hinders their job opportunities and their family and work life was the lack of 19.2%. The main factor which hinders the female researchers' productivity was the excessive workload 22%.

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Key words: Women, SNI, Gender, Equity, Equality.

INTRODUCTION

In Mexico, history has not been able to give women the prominence they deserve because it minimizes their role in science. The role of women has been limited to activities related to home care, so their capacity for research, production and creation in the field of science is underestimated. Opportunities for women to participate in science have been scarce because of the social conditions that have made it difficult for them to access education and scientific works, such as scarce resources, training, time and family issues, among many others. Nowadays, we live in a society where science is presented under dichotomous and social stereotypes, where women do not have the same scientific opportunities as men. Unfortunately for women, it is not so easy to venture into certain professional areas especially in the areas of science, technology and innovation, where they have been very limited. However,

Mexican women have been gradually breaking certain dichotomies and paradigms related to gender stereotypes demonstrating that they possess great skills, abilities and knowledge. The most important problem faced by women in the field of science, especially in the area of research, is the scarce presence of women in nationally recognized research programs, such as the National System of Researchers (SNI), because within this program, the proportion of male researchers is higher than that of women, according to the open database of National Council of Science and Technology (CONACYT, 2017) the SNI had 27,187 members, of which 17,274 were men and only 9,913 women (36.46%), a difference of only 0.26% with respect to 2016 data. This demonstrates the unequal opportunities towards women, since the predominance of men in the investigation monopolize a quota of more than 63% of the

SNI's human capital. Unfortunately, men not only statistically surpass women occupying more positions as researchers, but in many cases they are relegated to technical work or to work as collaborators. Nowadays, women are no longer excluded in universities and research centers, which means advances in gender equity, with pending work in equal opportunities of scholarships, work, and salary.

MATERIALS AND METHODS

The methodology used in this research work is based on the quantitative paradigm, with an empirical-analytical approach. The research is oriented to an intentional non-experimental design in which each unit or group of units is carefully and intentionally selected for its possibilities of offering deep and detailed information on the subject of interest for research (Martínez, 2012) of a transversal or transactional. The data collection was carried out through the survey technique. The instrument was structured with a total of 50 items based on the objectives of the research. To perform the analysis of the results, the Statistical Package for the Social Sciences (SPSS version 24) was used, where all the variables of this investigation were analyzed and tabulated. The informants were the researchers belonging to the National System of Researchers, according to the open database of the CONACYT (2017) there is a total of 9,080 women representing 36.20%. From that population a probabilistic sample was taken using the following formula:

$$n = Np (1 - p) \quad (N - 1)B^2 + p (1 - p)$$

Z2 conf

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n = Sample size. N = Population.

p = Estimation of the proportion.

Z = Statistical value that guarantees a prefix estimation level. B = Precision level

Thus, with a reliability level of 91% with a margin of error of 0.9% and a ratio of 0.07, the sample consisted of 184 informants. The age of the research subjects ranges from 30 to 72 yrs belonging to these levels: candidate, Level I, II and III of the SNI and also to the seven areas of knowledge.

RESULTS

In the 21st century we find machismo, misogyny, abuse, sexism and sexual harassment as some of the situations that women have to face, not only the ones from Mexico,

but from all over the world. It is time to raise the voice and let the world know that women can do absolutely everything. That is why it is necessary to make a global struggle by spreading our voices and ideas, creating communication channels in the scientific world. If in the scientific field the researchers begin to have women as leaders, then the future generations will have more examples and they will know that it is possible to achieve success. The hard work and the union between women researchers creating connections between themselves is the best way to support each other. In all areas of science, research and/or teaching, we currently find inequality. It is necessary to intensify the information with a gender no longer leaving the woman aside because of the mere fact that had been born a woman. The studies on the situation of women in science are clear and the numbers confirm it. Women are quantitatively minority, but they are closer to social positions and academic categories, only in 2017 the SNI had 27 thousand 187 members, of which only 17,274 were men and 9,913 women (36.46%), only 0.26% more compared to 2016. This is because more and more women are accessing knowledge and science in our country. However, the superiority of men continues to exceed 63%. It is important to point out that in the study that was carried out with regard to academic studies, 98.9% of women members of the SNI have a PhD from which 77.35% were awarded a scholarship by CONACYT. Women like and care about science and research. The problem is that the recognition they receive is not the same as the one that their male colleagues get. 40.7% of the researchers believe that women are not given due recognition in science and research. Many times, women researchers and teachers have modest attitudes, value positive relationships with their students, and their families, although this does not serve as a merit for their professional career. As they go up in positions or levels (distinctions) the numbers of women who have the same position decreases. The majority of the researchers are in Level I (60.8%); and candidate (26%) followed by Level II with 9.2% and finally, Level III with a percentage of 3.8% within the register, where 58.1% of the women declared not to have received any kind of award or recognition for their scientific work.

Women show an active participation in the seven areas of knowledge that are managed within the SNI, predominating in the following areas; IV (Humanities and Behavioral Sciences) with 35.8%; followed by Area II (Biology, Chemistry and Life Sciences) with 19.5%; and in Areas V (Social Sciences) and VI (Biotechnology and Agricultural Sciences) with 14.6%. On the contrary, participation figures decrease in the following areas; I (Mathematics, Physics) with 3.2%; III (Medicine and Health Sciences) 4.3%, and; VII (Engineering) 7.6%. This panorama allows us to speak of a territorial discrimination in which women opt for traditionally female careers, a trend that is constantly decreasing, except in engineering that still has a very low percentage of women. In conclusion, in our country, it

happens the same as in many other countries, since people still do not manage to break the paradigms that limit women's access to exact sciences, such as engineering. Another relevant piece of information in this analysis is the relationship between age, marital status and the number of children of the subjects of study. The sample consists of 184 informants ranging from 30 to 72 years, with an average of 40 years. It is possible to note that 57% are married; 23.3% single; and, 11.4% divorced. 22.2% said they had only one child and 36.4% had no children. This data is extremely important, since it is linked to the perception that women have regarding direct and indirect discrimination in their scientific environment. Regarding this, women's perception regarding discrimination shows that 47.8% and 2.7% of women feel sometimes and always directly discriminated within their scientific environment, these numbers decreased 6% when women were asked if they have felt any type of discrimination within their workplace, since they claimed to have sometimes felt discriminated and increased by 3.2% in "always". A similar perspective is shown in relation to indirect discrimination where 44% said that they sometimes feel discriminated in their scientific environment, while 16.3% mention that they always feel indirectly discriminated in their workplace, a number that increased by 10.4% in relation to the perception of direct discrimination. On the other hand, 45.6% of the women researchers indicated that they were at a disadvantage with their male colleagues in the scientific field; and only 21.1% felt this in their work places.

These numbers lead us to think that older researchers tend to reflect more in depth than younger researchers, since they tend to project discrimination as a "non-existent" or "external" problem. The difference in age reflects motherhood and science in different positions. A few decades ago, it was believed that women should choose to form a family and develop a profession in which maternity was not left aside, yet the new generations begin to put aside motherhood, marrying the science. What can be perceived as a discrepancy between family and the scientific profession, since they feel pressured and without a time limit, often due to the fact of having children, a situation that can delay but not elude. The productivity of women researchers can be analyzed through the number of publications and its impact which is related to their age and marital status, as well as the distinction they have obtained, as well as what is required in each of the areas of the SNI. The study indicates a low scientific productivity in women, which is used as an argument to explain their lower promotion and presence in the higher categories. However, the data show that in terms of scientific productivity every 3 years, women publish on average 3.50 international articles indexed as first author and 3.6 as collaborators, means that are higher than those of national publications. With regard to the book chapters, women researchers carry out more national publications as the first author, average of 1.86. Panorama that differs greatly in the case of patents

since in this we find an average of 03 (first author) and 01 (collaborator) at national level and a complete absence in international patents number that are not strange, since as it is known women do not predominate in exact sciences, and thus it is not required the creation of patents.

Another interesting fact to emphasize is the average time they have been working with the SNI, which is 7.2 years, where only 15.2% have quitted at some point, pointing; the time (46.2%) and the family (17.9) as the main causes of his desertion. Women resist long periods of interruption in their scientific careers, as they assume that it distances them from their colleagues and their professional ambitions, which will lead them to lengthen their access to stable or more recognized positions. And this is why it is important that the care of children and elderly people become shared tasks, in this way female researchers can distribute their time and form working groups without leaving aside family matters. Among the main factors identified by the SNI that hinder their scientific work we can find the absence of a consolidated labor policy that favors the reconciliation of work and family life (19.2%); difficulties in sharing domestic responsibilities and caring of the children (17.1%), gender stereotypes (10.2) and work discrimination towards women (7.3%). While the factors that hinder the job opportunities of women researchers are the excessive workload (22%), the lack of financial support (19%), the lack of infrastructure (15%), the lack of institutional support(11.3%) and difficulties in sharing domestic responsibilities and caring for the children(10%).

DISCUSSION

The results of this research show a meaningful improvement in scientific participation within the country. Mendieta (2015) points out that one of the most meaningful SNI's achievements is the growing female enrollment in the 1994-2014 period which went from 20.41 to 34.81%. This means that it increased 14.44% in 20 years. If we compare this data with the 2017 figures (36.46%), an increase of 1.65% can be observed, an achievement in gender equity matters. According to Didou and Etienne (2010), women are not part of the majority in any of the SNI's disciplines, although they are better represented on discipline IV, Human and Social Sciences, with a 48.4%. This figure does not differ much with the 2017 one, since women were still being represented on discipline IV, with 35.8%. On the other hand, women's presence weakens as the hierarchical level increases. Women represent 39% of total candidates, but their proportion lowers to 34.6% on level 1, 28.5% on level 2 and only 18.6% on level 3 (Cárdenas Tapia, 2015), whereas in this research, female researchers make up for 26% of total candidates, and a percentage of 3.8% within level 3 of the SNI. The contrast between these two research works reaffirms that the female presence is still low in the

higher levels. This is a demonstration of the so-called Scissor Effect (or Pyramid Effect): the majority of female researchers are on candidature level or on level 1. On level 2, this figure decreases and on level 3, female presence is almost nonexistent (Valles and González, 2012).

Regarding postgraduate scholarships programs for training, out of the 159 female researchers who were interviewed, 77.35% of them received a scholarship from the CONACYT in order to study a postgraduate degree. This surpasses the 46.5% of national scholarships assigned to women by the CONACYT of December, 2017. This data shows CONACYT's actions regarding equal opportunities for men and women, as well as the inclusion and women's rights. Lau y Cruz (2005) assure that many Mexican movements and universities have made some efforts to help women obtain further participation in government, society, politics and education. An example of this is the fact that women represent the 44.2% of the enrollments, a consequence of the multiple efforts carried out by competent organisms and institutions. On the other hand, Mexican female researchers need to organize and break the distinctive individualism of their work place in order to seek social solutions which, in short term, readjust the roles and functions usually assigned to each gender within family and community (Zubieta and Marrero, 2005) since the main factors which create obstacles to women are: excessive workload, lack of work politics which favor the coexistence of their family life and their work life, difficulties while sharing their house responsibilities (including who will take care of the children), gender stereotypes, among others. In the same vein, the research carried out by Mendieta Ramírez (2015) also complements these results. In her research, she presented work harassment (perpetrated by other researchers and workers), family limitations (which forces them to abandon their careers in favor of their families' lives) and the lack of women's representation in the SNI's disciplines as factors that hinder women's participation in institutional programs and institutions which decide public politics.

CONCLUSIONS

It is impossible to deny the fact that women seek to make work and family compatible at the expense of their time, while their colleagues of the opposite sex use their free space to carry out academic activities or the ones that generate some economic income. Given this situation, it is necessary that labor policy consolidates and promotes the reconciliation of work and family life. There is a need for subsidized day care centers that really care for children, as well as organizations that consider older adults. Especially it is necessary to raise awareness among men of all ages that the care and attention to others is a shared responsibility. In this way, motherhood and family care will not be an obvious disadvantage for women. We should not

be led by the belief, shared by a large number of members of the scientific community, that the current situation of women in science is the result of the late incorporation of women into the world of work and science, since there are many factors around this. Believing that time will balance these numbers is wrong. It is a fact that in the last decades the scientific participation of women has increased. However, these advances have been achieved thanks to the fact that women have been made visible to the academic and political authorities. To say that time fixes everything is a comfortable response, which makes it difficult to become aware of the real situation and dissuades the action, time is not the solution, the real solution are the measures dedicated to reducing inequality in institutions, laboratories and university classrooms, where women already have a remarkable participation. The solution is not found in words, but in actions and attitudes, public awareness campaigns should be implemented to break gender stereotypes and show the reality of women's professional work using all the necessary means to reach as many people as possible, leaving discrimination and inequality in the past and encourage the new generations to science and technology as well as gender equity.

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