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Working Conditions of Women Scientist in a Peripheral Mexican Higher Education Institution

Condiciones laborales de científicas en una institución de educación superior periférica mexicana

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ABSTRACT

Recently, there has been a trend of feminization in the educational and professional fields. Such tendency has been considered a step towards gender equality. However, its significance in the overall quality of life for Mexican women has been narrowly evaluated. This article analyses diverse factors impacting the overall labor conditions of Mexican scientists (male and female) at a peripheral institution, as well as in their chances of being excluded from the Sistema Nacional de Investigadoras e Investigadores, as a mean to highlight the vulnerabilities of the female Mexican scientists geolocated outside the core of the educational system. For this, 140 surveys were applied: their results demonstrate the extent to which the distribution of academic work still responds to a traditional sexual division, negatively impacting the inclusion, in disadvantaged conditions with high social costs, of women in the scientific field.

Keywords: 1. gender, 2. woman scientists, 3. SNII, 4. higher education, 5. periphery.

RESUMEN

Recientemente se ha observado una tendencia feminizadora en los ámbitos educativo y laboral. Dicha inclinación ha sido entendida como un paso para la equidad de género, sin embargo, su significancia en la calidad de vida de las mujeres mexicanas ha sido escasamente evaluada. En este artículo se analiza cómo diversos factores inciden en las condiciones laborales de científicas/os mexicanas/os adscritas/os en una institución periférica del sistema educativo superior, así como en su exclusión del Sistema Nacional de Investigadoras e Investigadores, con el fin de visibilizar la vulnerabilidad de las científicas mexicanas geolocalizadas fuera del centro del sistema educativo. Para ello se aplicaron 140 encuestas, cuyos resultados demuestran que la distribución del trabajo académico responde todavía a la división sexual tradicional, impactando negativamente en la inclusión de las mujeres al ámbito científico, dándose en condiciones de desventaja y con altos costos sociales.

Palabras clave: 1. género, 2. científicas, 3. SNII, 4. educación superior, 5. periferia.

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INTRODUCTION

Over the past two decades, a trend toward the feminization of the labor market has become evident. This development has been driven by feminist social movements, the legislative reforms they inspired, broader societal changes linked to demographic and economic shifts, and sustained academic research. While this trend has been positively evaluated from a quantitative standpoint and is often cited as progress in gender equity, there has been limited critical examination of its actual outcomes. Questions remain about whether women's increased participation has resulted in tangible benefits such as pay equity, access to benefits, improved working conditions, or leadership roles, or whether it has come at social and personal costs, given that many of these spaces continue to operate according to masculine logics and modes of participation.

De Oliveira and Ariza (1999), García (2001), García and De Oliveira (2001), and Rendón and Maldonado (2005) argue that labor opportunities and conditions for Mexican women and men continue to reflect a traditional sexual division of labor. This enduring structure, in turn, shapes the broader organization of the Mexican labor market. According to data from the Encuesta Nacional de Ocupación y Empleo, Nueva Edición (ENOEN; National Survey of Occupation and Employment, New Edition), conducted by the Instituto Nacional de Estadística y Geografía (INEGI; National Institute of Statistics and Geography), as of February 2024, the economically active population included 60.9 million individuals aged 15 and over, corresponding to a labor force participation rate of 60.2%. Disaggregated by sex, the participation rate was 75.8% for men and 46.6% for women (INEGI, 2024). To illustrate the unequal conditions under which women access the labor market, the following indicators are especially relevant:

1) Among the employed female population, 3.2% work as employers, 5.5% as unpaid workers, 22.2% are self-employed, and 69.2% are salaried employees or wage earners. Regarding sectoral distribution, 25.5% are employed in commerce, 15.9% in manufacturing, 14.5% in personal services, 13.1% in social services, 12.2% in restaurants and accommodation services, 8% in professional, financial, and corporate services, 3.9% in government and international organizations, 3.2% in agriculture, 2% in transportation, communications, postal services, and storage, 0.9% in construction, 0.5% in unspecified areas, and 0.4% in the extractive and electricity industries (INEGI, 2024).
2) 55% of women are employed informally, compared to 49% of men.
3) The average wage gap stands at 35%, meaning that for every 100 pesos earned by a male worker, a female worker earns only 65. Gender disparities are also evident in leadership positions: women hold just 25% of legal department directorates, 11% of finance directorates, and 4% of general directorates. Female representation on corporate boards in Mexico is 13%, and women occupy only 33% of senior management roles within federal government ministries (Instituto Mexicano para la Competitividad [IMCO], 2024b).
4) Workplace violence affects three out of every ten women in the labor market (IMCO, 2024b).
5) The persistence of masculine norms continues to shape the female labor market. These norms, for example, often overlook unpaid reproductive labor, which is traditionally expected of women.

> Beyond this traditional sphere, women represent only 33.3% of the global workforce in science (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2021b). Moreover, women "tend to have more limited access to funding than men and to be less represented in prestigious universities and among senior faculty" (UNESCO, 2015, p. 34). Within this professional field, UNESCO highlights that the regions with the highest female researcher participation are Southeastern Europe (49%), the Caribbean, Central Asia, and Latin America (44%).

Although data on women's participation in scientific research are increasing, significant gaps remain regarding their performance and the barriers they face in establishing career trajectories comparable to those of their male counterparts. For instance, in countries such as Brazil, India, and Nigeria, sex-disaggregated data are not collected. Additionally, because data from North America and China cannot be reliably compared with other sources, these regions are often excluded from international statistics (UNESCO, 2021a).

In Mexico, women make up 38% of those pursuing careers in science, technology, engineering, and mathematics (STEM) (Andrade Baena, 2023), although only 14.3% of university graduates hold degrees in these fields (Hernández, 2024). Several studies suggest that the choice of academic and professional paths is influenced by gender stereotypes and societal expectations (Alam & Sánchez Tapia, 2020; Juvera & Cruz-Sánchez, 2024), which often steer women toward careers traditionally viewed as feminine and associated with service, caregiving, entertainment, grace, and beauty. Furthermore, the limited visibility of female role models, partly due to the underrepresentation of women's contributions in science, along with familial influences, serve as additional factors shaping these career choices (Peterson et al., 2018; Reinking & Martin, 2018).

It is also important to note that the gender wage gap in Mexico varies by women's field of study or occupation. In STEM fields, the average gap is 18%, while in non-STEM fields it increases to 22% (García Doberganes & Masse Torres-Tirado, 2022). These structural conditions have led to persistent gender inequities across many aspects of social life, and women's work in science is no exception to these disparities.

This article presents an analysis that revisits several of the previously mentioned dynamics, highlighting the geopolitical position of the institutions where women conduct their scientific work as a key factor in understanding the complexity of their participation in this professional field. This constitutes the primary theoretical contribution of the current research.

The structure of this article is as follows. It begins by presenting general aspects of the country's main regulatory body for science and the work of its scientists. Next, it reviews the literature on key factors explaining the conditions under which female scientists practice their profession in Mexico, including gender issues and the geopolitical position of the institutions where they work. Then, it outlines the methodological approach used, followed by the presentation of the survey results. Finally, the paper discusses the findings and concludes with final reflections.

MEXICO AND THE NATIONAL SYSTEM OF RESEARCHERS (SNII)

On December 29, 1970, Mexico's Consejo Nacional de Ciencia y Tecnología[4] (CONACYT) was established with the goal of coordinating federal public policies to promote scientific, technological, and innovation research in the country. In 1984, the Sistema Nacional de Investigadores[5] (SNI) was created to recognize individuals primarily dedicated to producing scientific and technological knowledge. It also serves as a mechanism to evaluate science dissemination efforts and to strengthen professional study plans and programs. Since its inception, this recognition has been granted through peer evaluation, awarding the title of national researcher in one of the following categories based on academic output: candidate, level I, level II, level III, and emeritus.

According to the current Secretaría de Ciencia, Humanidades, Tecnología e Innovación (SECIHTI),[6] the entity now known as the Sistema Nacional de Investigadoras e Investigadores (SNII) supports the training and consolidation of researchers with the highest level of expertise. Membership in this select group provides opportunities to hold better job positions, take on managerial roles, and receive additional income beyond the standard salary benefits granted to regular employees (Aguilar Ramos, 2022, p. 4).

Nevertheless, multiple studies have confirmed that the scientific research process—which encompasses the consolidation and recognition of researchers—exhibits a gender bias that favors scientists identified as male, thereby limiting the participation and recognition of women (Hernández Hernández, 2020; Bracamontes Ramírez et al., 2021; Estrada Mota, 2022). When this incentive program was launched, there were five men for every woman in the system (1 143 men versus 253 women), reflecting a gender participation gap of 64 percentage points. As of June 2024, among the 17 800 members of the SNII, 40.4% were women (10 609 men and 7 191 women). Although the number of women has grown, significant progress remains to be made. For example, only nine women currently hold senior leadership positions within the public research centers of the SECIHTI, representing just 35% of the total (SECIHTI, 2025).

To critically assess gender equity in scientific research in Mexico, Cárdenas Tapia (2015) analyzed data on the total number of researchers affiliated with what was then the SNI during 2012, 2013, and 2015. Her findings revealed several persistent disparities:

1) Women were underrepresented across all seven areas of knowledge defined by the program, with their participation concentrated in just three: Biology and Chemistry, Humanities and Behavioral Sciences, and Social and Economic Sciences.
2) In terms of recognition levels and the distribution of incentives, women were most frequently classified as candidates and level I researchers, while their representation declined at levels II and III. The imbalance was especially pronounced at level III, where only 20% of recipients were women. Across all four levels, women's overall participation increased by just one

[4] National Council of Science, and Technology (unofficial translation).
[5] National System of Researchers (unofficial translation).
[6] Secretariat of Science, Humanities, Technology, and Innovation (unofficial translation).

percentage point during the period analyzed.

3) Finally, the three public universities with the highest percentages of female researchers were the Universidad Nacional Autónoma de México (UNAM), with 40%; the Universidad Autónoma Metropolitana (UAM), with 36%; and the Instituto Politécnico Nacional (IPN), with 32%.

An analysis of the updated 2023 Registry of Scientists indicates that the trends identified by Cárdenas Tapia (2015) persist, with little progress in improving women's conditions. The 2023 registry includes 43 979 members; however, unlike previous years, the data are not disaggregated by sex—an important change that effectively obscures ongoing disparities and the minimal reduction of gender gaps. This occurs despite the presence of a left-leaning government, parliamentary gender parity, and reforms to the Ley General de Educación[7] and other Mexican regulations aimed at reducing gender inequality. It is worth noting that these data remained available in CONACYT's historical archive at least until April 2024, but since the establishment of the new SECIHTI, this information has not been included on its new online portal (SECIHTI, 2024).

As evidence of this, El Colegio de México conducted an analysis in the context of International Women's Day (March 8) 2024, reporting that in 2023 the composition of the SNII was as follows: level I, 39.7% women and 60.3% men; level II, 34.7% women and 65.3% men; and level III, 23.8% women and 76.2% men (El Colegio de México, 2024). These data demonstrate that the gender gap widens progressively with each higher level within the SNII. Furthermore, the analysis excluded researchers at the Candidate level, revealing a bias against the lowest tier, where female participation has historically been the highest.

Evidence from various studies has explored women's participation in the SNI/SNII (Meza Mejía et al., 2019; Contreras Gómez et al., 2022; Carrillo Espadas & Flores Galaz, 2023). However, to date, there has been no comprehensive analysis of the participation of women and men engaged in scientific work in Mexico who, for various reasons, are not members of the SNII. Furthermore, no intersectional analysis has examined how gender intersects with the positioning of scientists within universities situated at the center, semi-periphery, or periphery of the Mexican research system, nor how labor conditions structurally disadvantage certain groups in their pursuit of a scientific career in Mexico.

Within this context, the present research aims to examine the organization of scientific work in Mexico through an intersectional lens. Using full-time faculty members with doctoral degrees at a public university in northwestern Mexico as a case study, the study seeks to highlight the multiple ways in which gender and other labor conditions influence the career progression of scientists within the country's scientific system.

[7] General Education Law (unofficial translation).

THEORETICAL FRAMEWORK

The theoretical framework is grounded in gender theory (Rubin, 1996; Scott, 2003) and world-systems theory (Frank, 1966, 1967; Wallerstein, 1979; Alderson & Beckfield, 2004). Drawing on Rubin (1996), the framework recognizes the sex-gender system as the foundation upon which social structures worldwide are organized. This system is a historical construct based on dichotomies where two sexes (female/male) are represented as opposite and complementary, and this relationship of dependency forms the basis of social life. As a result, the sexual division of labor is constructed, primarily in Western contexts, through processes of meaning-making that positively value traits considered masculine (associated with rationality, non-assertiveness, provisioning, and the public sphere) while negatively valuing traits deemed feminine (linked to emotion, assertiveness, care, and the private sphere).

To define gender as a category of analysis, Scott (2003) proposes the following:

> Gender is a constitutive element of social relations based on the differences that distinguish the sexes. It constitutes a primary form of significant power relations comprising four interrelated elements: first, cultural symbols that evoke multiple representations, including myths of light and darkness, purification and contamination, innocence and corruption; second, normative concepts that interpret the meanings of these symbols and attempt to limit and contain their metaphorical possibilities; third, political notions and references to institutions and social organizations; and fourth, subjective identity. (pp. 289-291)

The category of gender constitutes the primary division of social exclusion, as it is a construct that divides and organizes the distribution of power and agency among social actors based on the meaning ascribed to their sex. It positions them within the established social hierarchy according to the delineation of functions and practices deemed valid, aligned with polar identities shaped through subjectivity and intersubjectivity within a specific temporal and spatial context.

From a gender perspective, it is important to consider concepts such as the feminization of the labor force, workplace discrimination, the glass ceiling, and the double burden. The feminization of the labor force primarily refers to the numerical increase of women in occupations socially constructed as *feminine*—such as cleaning services, food preparation, secretarial work, and caregiving for the sick, children, or elderly. It also encompasses women's broader entry into the labor market and their growing participation in professions traditionally viewed as masculine, though not yet in majority, but with enough presence to have a noticeable impact in those fields.

This development has often been viewed as a positive outcome of the feminist movement's struggle and efforts to promote gender equity. However, from a more critical and nuanced perspective, the feminization of the labor market has coincided with job devaluation and increased precarity, that is, a decline in symbolic value and a form of stigmatization affecting how women's and men's labor is perceived. As women increasingly enter the workforce, they contribute to a labor surplus that has strained social security systems, often by participating in informal or socially unprotected employment.

Likewise, the average wages earned by women have declined, as the majority are employed in temporary and precarious jobs. Women are often paid less than men for performing the same work, which contributes to their recruitment into lower-skilled positions (Gómez Solórzano, 2008). In other words, although women have increased their participation numerically, they continue to do so under disadvantaged conditions. In this context, the feminization of the workforce and the labor market has generated spaces and dynamics that perpetuate oppression and violence against women, particularly in fields deemed more "relevant" by dominant social perspectives—such as knowledge production, science and technology, finance, economics, and politics.

Gender-based labor discrimination and the *apparent* inclusion of women in the workforce demonstrate that, even today, the traditional division of labor rooted in gender stereotypes continues to shape the roles and positions available to men and women. As a result, mechanisms such as the *glass ceiling* and *sticky floor* have emerged to explain how the gender gap endures in the labor market.

Why is discrimination an obstacle to the genuine inclusion of women in the labor market? According to article 1, section III of the Ley Federal para Prevenir y Eliminar la Discriminación (LFPED),[8] discrimination is defined as:

> any distinction, exclusion, restriction, or preference, whether by action or omission and whether intentional or not, that is not objective, rational, or proportional and that has the purpose or effect of obstructing, restricting, impeding, undermining, or nullifying the recognition, enjoyment, or exercise of human rights and freedoms (LFPED, 2003, p. 1).

That is, individuals should not face discrimination based on ethnic origin, skin color, sex, gender, disabilities, pregnancy, family situation, family responsibilities, marital status, migration status, or other similar factors. In the context of the labor market, workplace discrimination can be understood as any action or omission that differentiates, excludes, restricts, or favors the hiring, retention, or advancement of any individual in decent working conditions based on these factors. This article focuses on the workplace discrimination experienced by Mexican female scientists due to sex, gender, pregnancy, family situation and responsibilities, and marital status, and how these factors affect their positioning at the periphery of the country's scientific system.

The concept of the *glass ceiling* has been recognized for four decades and refers to an invisible barrier that prevents qualified women from advancing to higher positions within their organizations. It is called the "glass ceiling" because, while it blocks the progress of those below it, it remains difficult to perceive since it is rooted in cultural meanings. For women, these meanings relate to traditional gender roles, which translate into social conventions that justify their exclusion and lack of promotion, particularly due to conflicts arising from time demands such as family, domestic and caregiving responsibilities, pregnancy, and similar factors that are not typically expected of men. Additionally, the glass ceiling is reflected in the high availability requirements of senior roles and decision-making positions, as well as in gender stereotypes

[8] Federal Law to Prevent and Eliminate Discrimination (unofficial translation).

associating leadership with traits like rationality, assertiveness, and aggressiveness, which are viewed as necessary for effective organizational management (Camarena Adame & Saavedra García, 2018).

On the other hand, the sticky floor refers to organizational, normative, and cultural conditions that systematically confine women to lower-level positions with fewer responsibilities, lower salaries, reduced benefits, and other disadvantages. According to Ramos et al. (2003), this sticky floor is constructed through several barriers. Internal barriers are linked to female gender identity, meaning the internalization of traditional gender roles that each woman experiences during her identity formation. External barriers include informal rules and male networks, often referred to as "old boys' clubs," within organizations; human resources policies related to personnel selection and promotion; a lack of strategies to support the reconciliation of family and work life; the absence of female role models to guide and open paths for other women; and the scarcity of female support networks. Additionally, barriers arise from the incompatibility between women's productive and reproductive responsibilities, such as the triple role women often perform as wife, mother, and executive.

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2) External barriers include informal rules and male networks, often referred to as "old boys' clubs," within organizations; human resources policies related to personnel selection and promotion; a lack of strategies to support the reconciliation of family and work life; the absence of female role models to guide and open paths for other women; and the scarcity of female support networks.
3) Additionally, barriers arise from the incompatibility between women's productive and reproductive responsibilities, such as the triple role women often perform as wife, mother, and executive.

The concept of the *double or triple shift* arises in this context, referring to the extended hours women work both inside and outside the workplace. These extended hours generate stress and reduce the time available for rest and self-care. Together, these concepts help explain the negative aspects of the feminization of the labor market, especially when the prevailing rules are androcentric, meaning they are designed by men and based on male interests. This makes it difficult for women to comply. This situation is particularly evident among highly qualified women, such as scientists at a peripheral university in northern Mexico, whose career trajectories often differ from those of the broader female population.

To develop the second category, *intersectionality*, world-systems theory is used, particularly Frank (1966), who describes development and underdevelopment as dependent and extreme relational phenomena. Through capitalism, satellite regions become dependent on metropolitan

centers, subordinating the development of the former to the latter and creating exploitative relationships that repeat indefinitely. Building on Frank's framework, Wallerstein (1979) explains that market growth and the resulting global division of labor generate differences among nations, positioning them as either core or peripheral. These positions are linked by asymmetric power relations that produce unequal exchanges. The core produces goods with high wages, low supervision, high profitability, and capital-intensive processes, while the periphery produces goods with low wages, high supervision, low profitability, and low capital intensity. In the core, production relies on free labor compensated with appropriate wages, whereas in the periphery, production depends on forced labor with little or no remuneration.

Other authors contributing to the theoretical framework of this work include Alderson and Beckfield (2004), who identified a global capitalist urban system that divides and organizes labor in cities into three zones: central, semi-peripheral, and peripheral. Central cities host monopolistic companies engaged in the most productive activities, supported by governments that promote free-market competition through deregulation. While domination relations do not exist within central cities themselves, these cities initiate the relations that control and dominate semi-peripheral and peripheral cities. Semi-peripheral cities are dominated by central cities but, in turn, dominate peripheral cities. This means they contribute through their services to the domination exerted by central cities, yet their position allows them to avoid complete exclusion from the benefits of the market and free competition. Finally, peripheral cities are those subjected exclusively to domination and, due to structural disadvantages, are unable to establish relations of domination or mobilize toward improved positions within the global urban system.

Building on these arguments, it is contended that contemporary societies remain organized according to this global urban system, where the social division of labor reproduces underdevelopment and dependency across three zones: the core, which hosts monopolies engaged in the most productive activities with the highest social value; the semi-periphery which supplies services and skilled or semi-skilled labor to the core; and the periphery, where exploitable resources and raw materials are produced, serving as the site for the externalization of global production costs.

In addition to cities, transnational corporations, governments, international organizations, global banks, educational institutions, and the networks connecting them play a significant role in shaping the core-periphery world system. The core-periphery category is based on these premises, aiming to highlight the dependent and underdeveloped conditions of researchers according to their geographic location. It also considers the roles and functions researchers perform both in scientific production and in the reproduction of the national educational system, which itself responds to the geopolitics of the national and international urban system.

METHODOLOGY

This applied, descriptive, mixed-methods study was conducted in two phases: the first in 2021 and the second between 2023 and 2024. The initial phase was exploratory and quantitative, involving a survey administered to researchers at the Universidad Estatal de Sonora (UES) to identify and define those working as scientists at an institution considered part of the periphery of the Mexican higher education system. In the second phase, in-depth interviews were conducted with female researchers from the same institution, guided by analytical categories derived from the survey. This article presents the results of the quantitative phase, during which the core-periphery category was developed based on the premises outlined above.

The criteria for defining UES as a higher education institution situated at the periphery of the national education system is based on a combination of quantitative and qualitative criteria, presented below in order of application:

A. Although it is one of the main public higher education institutions in the state of Sonora, the UES does not appear among the top institutions in national rankings (it is ranked 89th according to 4ICU.org, the only national ranking in which it is listed) (Mextudia, 2025), and has even less visibility in international rankings, where only a few Mexican universities are represented.

B. The budget allocated to university operations, particularly for the development of research projects, is limited. At the time of this study, no UES researcher was leading a project funded by SECIHTI, and internal research funding had been declining in recent years.

C. While research and collaboration networks do exist, the number of national and international networks led by UES academic staff remains low.

D. Only 8.9% of the faculty hold recognitions such as membership in the National System of Researchers (SNII) or similar national or international distinctions. Among these, the vast majority are classified as Candidates or SNII level I, with only three faculty members holding SNII level II status across the entire academic staff (UES, 2022).

E. The institution does not offer any doctoral programs. Although it currently offers five master's programs, as of early 2025, only two were recognized by the Sistema Nacional de Posgrados (National Graduate Studies System) of SECIHTI. This limits the institution's ability to contribute to the training of new researchers.

Researchers at the UES

Since the implementation of neoliberal policies in higher education, the public sector has aimed to professionalize academia by requiring faculty to engage in teaching, research, outreach, and extension activities. In practice, however, public policy programs designed to promote research and scientific work in Mexican academia have been concentrated in a limited group of institutions and disciplines. This has led to increased bureaucratic burdens on higher education institutions, which must now navigate complex administrative requirements and respond to

accountability demands in order to secure the funding necessary for their continued operation (Pérez-Castro, 2009).

This is reflected in the regulatory frameworks governing academic hiring in Mexico. For instance, according to article 2 of the academic staff statute of the UES, in force at the time this study was conducted, full-time (FT) professors are required to engage in teaching, research, cultural dissemination, student advising, and academic management within their area of expertise (UES, 2021). The FT professor role is divided into two ranks: Associate (levels 1 to 4) and Full Professor (levels 1 to 5). Faculty may be employed under one of two contractual modalities: fixed-term, with contracts renewed each semester, or permanent, which refers to tenured positions.

Survey and Sample Selection

At the time this study was conducted, the UES employed a total of 318 FT faculty members, of whom 286 (89.94%) held a doctoral degree. This group of FT faculty with doctoral qualifications, regardless of whether they held fixed-term or permanent contract, constituted the target population for the study, as their academic credentials positioned them to access a wider range of research incentive programs (UES, 2022). The sample size was determined using the formula for finite populations.

$$n = \frac{N * Z^2 * p * q}{d^2 * (N - 1) + Z^2 * p * q}$$

In this formula, the variables are defined as follows: N = population size; Z = confidence level (95%); p = expected proportion (50%); q = 1 – p (50%); d = margin of error (6%).

For this study, a theoretical sample was calculated using a 95% confidence level and a margin of error of +/- 6%, corresponding to a Z value of 1.96. The population proportion was set at 50%, reflecting the assumption that women and men had an equal opportunity to participate. Based on these parameters, it was determined that 139 surveys were needed to achieve a representative information density of the faculty affiliated with the UES, Hermosillo campus.

Participants completed a digital questionnaire, and the data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Based on the results, participants were classified into three categories: core (C), with five or more favorable indicators; semi-periphery (SP), with three to four favorable indicators; and periphery (P), with fewer than three favorable indicators. The following factors were taken into account:

1) Place of residence: Residing in Hermosillo was considered a favorable indicator for all faculty members, based on the competitiveness rating by IMCO (2024a).
2) University of employment: Employment at UES was considered an unfavorable indicator, based on major ranking classifications.
3) Membership and/or position in the SNII: Considered favorable if the individual is a member; unfavorable if not.
4) Type of contract: Favorable for those with permanent contracts; unfavorable for those with contracts renewed every semester.

5) Salary range: Favorable for faculty holding the rank of Full Professor; unfavorable for all other ranks.

6) Research support: Favorable if the individual currently has or has previously received research support, whether from federal sources or the institution's own funds; unfavorable otherwise.

The sample for this initial exploration consisted of 140 completed surveys, with 58.8% submitted by female academics and 41.2% by male professors from various fields of knowledge, as classified by SECIHTI. The distribution across fields was as follows: social and economic sciences (41%), humanities and behavioral sciences (26%), physics, mathematics, and earth sciences (7%), engineering and industry (7%), biology and chemistry (7%), biotechnology and agricultural sciences (6%), and health sciences (6%).

RESULTS

The following results are organized according to the categories of family situation, gender and work, labor conditions, and double or triple work shifts.

Family Situation

The average age of female researchers was 44.36 years, compared to 40.11 years for male researchers. These data suggest that women with postgraduate degrees and full-time contracts have largely passed or are nearing the end of their reproductive stage, whereas men in comparable employment conditions generally remain within the reproductive age range. Table 1 shows the distribution of participants by marital status.

Table 1. Marital Status According to Position

Position	Gender	Married (%)	Divorced (%)	Single (%)	Cohabitating (%)	Widowed (%)
Core	Female	52.2	8.7	21.7	13	4.3
	Male	60	13.3		20	
Semi-periphery	Female	44.4	22.2	27.8	5.6	
	Male	57.1	7.1	28.6	7.1	
Periphery	Female	77.8		22.2		
	Male	50		33.3	16.7	

Source: Own elaboration based on survey results.

As shown in Table 1, a high proportion of male researchers are in a relationship, whether married or cohabiting, regardless of their geopolitical location: 80% in the periphery, 85.7% in the semi-periphery, and 76.7% in the core. In this context, marital status may be considered a favorable factor in the professional development of male researchers. In contrast, 77.8% of women in the periphery are married, compared to 52.2% in the core and 44.4% in the semi-periphery. Notably, 22.2% of women in the semi-periphery are divorced, the highest proportion across all groups.

These findings suggest that marital status may influence the professional mobility of female researchers, with the semi-periphery representing the most challenging environment for women in partnerships.

On average, female researchers have 1.08 children, while male researchers have 1.18. The behavior of the "children" variable varies inversely with researchers' position in the system, depending on gender. In other words, the closer a woman is to the core, the fewer children she tends to have. In contrast, the closer a man is to the core, the more likely he is to have one or more children. These three indicators (family situation, reproductive stage, and reproductive life decisions) illustrate how such factors negatively influence the professional trajectories of female academics at UES. For women, unlike for men, greater independence and fewer reproductive responsibilities are associated with a higher likelihood of securing a full-time faculty position at the institution.

This underscores the persistence of gender stereotypes and the traditional division of labor, which assign positive value to family ties in men. These ties are often associated with character, reliability, leadership, and responsibility, all of which are qualities that can be transferred to and rewarded within the labor market. In contrast, similar family commitments are interpreted negatively in women, as signs of distraction, lack of professional responsibility, absenteeism, or dispersion. As a result, they are seen as limiting factors for women's dedication to productive work. It is therefore essential to acknowledge that family situation influences the professional trajectory and mobility of academic staff according to gender, and functions as a contributing factor to the exclusion of women from academia and scientific work, even under conditions that should support their comprehensive development.

Gender and Work

Despite progress in Mexican labor legislation, the data collected reveal that 8% of the surveyed women reported having been asked to take a pregnancy test at least once during a hiring process, even if not at their current institution. Additionally, 20% reported being questioned about their marital status during a job interview. Notably, 25.7% of male respondents also indicated that they had been asked about their marital status during the hiring process.

Regarding inquiries about potential pregnancy during the job application process, whether at their current institution or other prospective employers, 4.3% of academics positioned at the core reported having been subjected to such questioning. This figure rose to 5.6% for those in the semi-periphery and reached 22.2% among those located in the periphery. Respondents were also asked whether they were aware of any colleague who had been hired by their institution while pregnant. The results of this inquiry are presented in Table 2.

Table 2. Academics Aware of Colleagues Hired While Pregnant

Position	Gender	Yes (%)	No (%)
Core	Female	21.7	78.3
	Male	6.7	93.3
Semi-periphery	Female		100
	Male		100
Periphery	Female	11.1	88.9
	Male	16.7	83.3

Source: Own elaboration based on survey results.

Another notable finding is that 8% of women received negative comments due to being in a relationship, compared to 2.9% of men. Similarly, 16% of women were questioned about their plans to have more children, while 8.6% of men reported experiencing the same. Regarding the number of children, 8% of women received negative remarks about how many they have, whereas men were not questioned on this matter. When asked whether having children or caregiving responsibilities was considered a factor negatively affecting their professional development, 40% of women responded affirmatively, compared to 20% of men.

Marital status, number of children, and caregiving responsibilities affect individuals' entry, retention, and mobility in the workforce, with a more pronounced negative impact on women. Women not only face sexist questions during job interviews but also encounter moral judgments that disqualify them both as professionals and as individuals. This constitutes a form of double discrimination experienced when entering the labor market. The data also show that women have greater awareness of how gender stereotypes work against them. This awareness may influence decisions such as postponing motherhood, choosing not to have children, limiting the number of children, or deciding whether to stay married, divorced, or single. These strategies help women navigate obstacles to their entry, retention, and mobility within the labor market.

It is worth noting that, with respect to the location of postgraduate studies, 8.6% of female academics positioned in the core reported having studied abroad. This percentage increases inversely with their distance from the core: 27.8% of women in the semi-periphery and 30.2% of women in the periphery indicated they pursued their postgraduate education outside the country.

Women have learned to recognize the gender-based obstacles affecting their academic progress, either through personal experience or that of acquaintances. This awareness enables them to develop strategies to become more competitive and attractive to the higher education system and their respective institutions. In contrast, many men remain unaware of these factors. Additional analyses were conducted concerning marital status and the number of children participants have or plan to have in the future; the results are summarized in Tables 3 and 4.

Table 3. Questions About Marital Status at the Time of Hiring

Position	Gender	Yes (%)	No (%)
Core	Female	17.4	82.6
	Male	26.7	73.3
Semi-periphery	Female	22.2	77.8
	Male	28.6	71.4
Periphery	Female	22.2	77.8
	Male	16.7	83.3

Source: Own elaboration based on survey results.

Table 4. Questions About the Number of Children or Future Plans to Have Them

Position	Gender	Yes (%)	No (%)
Core	Female	13	87
	Male	6.7	93.3
Semi-periphery	Female	11.1	88.9
	Male	14.3	78.6
Periphery	Female	33.3	66.7
	Male		100

Source: Own elaboration based on survey results.

Based on participants' perceptions and experiences, they were asked whether having children or caregiving responsibilities for others (such as family members or partners) negatively affected their professional development. Thirteen percent of women positioned in the core reported that, within the last three years, their responsibilities were reduced or their positions changed due to pregnancy or having a child. This situation was also reported by 6% of women in the periphery.

This allows highlighting that gender stereotypes linked to the traditional division of labor remain obstacles for women researchers, both in obtaining positions and in retaining them, as well as in their professional mobility. In contrast, for male researchers, being married or having children is often seen as an advantage, interpreted as a sign of commitment and reliability that supports their job stability and career advancement. Therefore, it can be concluded that gender continues to serve as a primary criterion of social exclusion within academia. This occurs despite the fact that, given their access to information and knowledge, academics would be expected to understand the impact of these factors and promote social innovation through their work. However, the burdens imposed by the traditional Mexican sex-gender system persist.

Working Conditions

This category examined labor conditions including income level, type of employment contract, weekly workload, access to assistants or interns, membership in the SNII, receipt of recognitions, leadership in research projects, access to funding, and academic production. The main findings related to income range are presented in Table 5.

Table 5. Income Range, According to Position

Position	Gender	Less than 6 799 (%)	6 800 - 11 599 (%)	11 600 - 34 999 (%)	35 000 - 84 999 (%)	85 000 or more (%)
Core	Female		8.7	52.2	39.1	
	Male			40	60	
Semi-periphery	Female			83.3	16.7	
	Male	7.1	21.4	42.9	21.4	7.1
Periphery	Female	44.4	33.3	11.1	11.1	
	Male		66.7	33.3		

Source: Own elaboration based on survey results.

Regarding weekly teaching load, men positioned in the core work an average of 13.2 hours per week, while women work 10.6 hours. In the semi-periphery, women report an average of 13.8 hours, compared to 11.2 hours for men. In the periphery, women work 12 hours on average, whereas men report 17.8 hours.

Regarding access to assistants or research interns, the results revealed that none are available in the periphery. In the semi-periphery, 14% of men and 33.3% of women have access to such support. These figures contrast with the core, where 43.5% of women and 46.6% of men benefit from this type of assistance.

Table 6 shows membership in the SNII. Although women in the core and semi-periphery have a higher percentage of SNII membership, these percentages remain minimal. In the case of the core, membership is only 0.3%. Initially, it was planned to consider the level of membership within the SNII; however, upon reviewing the list of professors, it was found that all members were either candidates or level I. Therefore, the indicator was simplified to membership versus non-membership in the system.

Table 6. Percentage of Participants who Belong to the SNII, According to Their Position

Position	Gender	Yes	No
Core	Female	87	13
	Male	86.7	13.3
Semi-periphery	Female	61.1	33.3
	Male	57.1	28.6
Periphery	Female	33.3	66.7
	Male	50	50

Source: Own elaboration based on survey results.

Regarding leadership of federally funded research projects, women in the core and periphery had lower percentages compared to men. In the core, 52.2% of women led projects compared to 60% of men. In the periphery, no women led projects, while 16.7% of men did. In the semi-periphery, the distribution was more balanced, with 44.4% of women and 42.9% of men reporting project leadership. For projects funded by the state, women held leadership roles at higher rates across all locations, with only minimal differences compared to men.

Regarding academic production, participants were asked about the average number of publications over the last three years. The results are shown in Table 7.

Table 7. Average Production Over the Last Three Years

Position	Gender	Peer-reviewed articles	Indexed articles	Scopus/JCR articles	Books	Book chapters
Core	Female	4.68	5.25	4.58	1.38	4.11
	Male	5.07	5.8	4	1.15	3.73
Semi-periphery	Female	5.75	5.24	4.07	1	3.29
	Male	4.73	5.91	5.1	1.56	3.09
Periphery	Female	1.17	2.67	1.8	0.2	1.5
	Male	3	3	2	0	0.2

Source: Own elaboration based on survey results.

Women positioned at the core produce more Scopus/JCR articles, books, and book chapters than their male counterparts, while men produce more peer-reviewed and indexed articles. In the semi-periphery, women produce more peer-reviewed articles and book chapters than men. Conversely, in the periphery, men produce more indexed articles, Scopus/JCR articles, and books. Finally, in the periphery, women's productivity decreases relative to their male peers, with women producing only more book chapters than the male researchers.

Overall, it is observed that working conditions for male researchers are better than those for female researchers. The only area where women hold a better position or have greater access to funding is in receiving state resources. Conversely, teaching is the only indicator in which male researchers have a heavier workload than women. However, the weekly teaching load—which could be perceived or experienced as an obstacle in researchers' careers—does not actually function as such, since it does not prevent male researchers from leading research projects and producing more than their female counterparts.

Double or Triple Work Shift

Participants were asked about the number of hours per week they dedicate to domestic chores and caregiving for others, as well as to recreational and leisure activities. The results of this inquiry are presented in Table 8.

Table 8. Average Weekly Hours Dedicated to Various Activities

Position	Gender	Domestic chores	Reproductive work	Care work	Home repairs	Rest	Recreational activities	Meeting with friends
Core	F	9.57	8.64	4.71	1.18	26.64	4.26	2.5
	M	7.8	7.14	4.21	2.8	26.53	5.73	4.47
Semi-periphery	F	8.56	8.28	9	1	16.11	4.17	2.17
	M	5.75	7.08	3.73	2.69	7.92	4.83	2.17
Periphery	F	9.33	12.56	16.89	1.78	23.22	4	2.22
	M	13.83	9	11.5	2.67	25.5	0.67	2

Source: Own elaboration based on survey results.

Researchers in the periphery spend more hours on domestic chores than any other group and also dedicate less time to recreational activities. In general, men spend less time on domestic chores and caregiving but allocate more time to home repairs, rest, recreational activities, and socializing with friends. This distribution of labor reflects the traditional sexual division linked to gender roles, which favors the development and productivity of male researchers, who effectively work a single full-time shift. In contrast, women undertake double or triple shifts weekly, which negatively impacts their productivity and leadership in research projects, thereby contributing to the widening gender gap.

Therefore, it stands out that researchers located in the periphery face double shifts, as on average they dedicate 40.56 hours per week to domestic chores, reproductive work, care tasks, and home repairs. This represents a full workweek in addition to what is understood under the current Mexican legal framework. Meanwhile, the triple shift occurs when these researchers undergo periods of academic training or specialization that demand more than 8 hours of daily dedication.

FINAL REFLECTIONS

The feminization of higher education and the increased entry of women into scientific work have resulted in greater numerical representation and some positive outcomes for this population group. However, the anticipated benefits have yet to be fully realized. This is largely because the division of labor remains traditional, rooted in the local sex-gender system that places men and masculinity at the center of structures of domination and privilege (Bourdieu, 2000). Specifically, women's integration into scientific work is complex, as sexual differences, assigned values, and functions permeate the Mexican higher education system. These factors contribute to inequitable conditions that render women vulnerable through low wages and employment contracts affected by aspects such as marital status, pregnancy, and maternal caregiving responsibilities. These conditions, combined with the traditional sexual division of labor, sustain the reproduction of double and triple work shifts for female researchers.

This highlights the persistence of the glass ceiling, which prevents women from accessing leadership and decision-making positions within organizations, and consequently limits their ability to fully benefit from the Mexican scientific system. Such benefits become attainable only for those who, through personal strategies and sacrifices, such as remaining single, divorcing, foregoing having children, or extending their work hours, manage to move out of the periphery and integrate into the semi-periphery. In this intermediate space, scientists at the Universidad Estatal de Sonora enjoy more equitable working conditions related to salaries, productivity, recognition, and research support. However, at both the core and peripheral poles, female scientists and researchers remain more vulnerable compared to their male counterparts.

It was confirmed that women continue to bear high social costs in practicing their profession, particularly in research and the development of new knowledge, regardless of their position within the system. These costs often involve sacrificing or foregoing private and family life, as well as leisure time for recreational activities. In general, female researchers have fewer children, marry less frequently, and divorce more often than their male counterparts. Additionally, they spend more hours on reproductive work.

There are also economic costs that affect how effectively female scientists at UES can use their salaries. To free themselves from certain reproductive tasks, these women often need to pay for services such as prepared meals, laundry and ironing, home cleaning, or enrolling their children in private schools with extended hours that better accommodate their work schedules, among other examples.

The sex-gender system shapes social structure and defines the distinct roles and functions of women and men within a given context. This framework helps explain why the feminization of education and the labor market in Mexico, particularly in Sonora, has not translated into genuine progress in gender equity. Traditional structures and asymmetric power relations that exclude women—both directly and indirectly through gender-based discrimination—remain unchallenged. Therefore, the progress observed has been primarily quantitative rather than qualitative. To advance toward a more equitable society, it is essential to deconstruct the prevailing sex-gender system.

The feminization of professions offers little benefit if the rules of the game and the exercise of power continue to be constructed and legitimized based on logics of male domination. As explained earlier, the negative aspect of feminizing the labor market has involved the deterioration of working conditions not only for women but also for men within it. This process of deterioration is also evident among the surveyed female scientific population, who, despite being highly qualified, face more adverse working conditions, particularly at the core and periphery of the system.

The complexity of women's participation in scientific work is increased by the intersection of the traditional sex-gender system and the core-periphery system that shapes academic job opportunities. It is therefore important to place these issues on the labor agenda, making them visible and encouraging reflection to find ways not only to promote the entry and retention of women in academia and research but also to ensure their mobility under equitable conditions. This requires ending the privileging of men whose qualifications are equal to or lower than those of female scientists at UES or any other higher education institution in Mexico and worldwide.

Women should not have to bear high social costs to pursue a career trajectory equal to or better than that of their male peers, nor should they be forced to choose between professional advancement and family life in order to reduce their vulnerability within academia. It is time to develop strategies that challenge gender-based stereotypes, dismantle the sticky floor that confines women to teaching, administrative, and mid-level management roles, and promote the creation of statutes, manuals, and institutional practices that, above all, make the glass ceiling visible. Only then can the internal and external barriers that prevent female scientists at UES from leading networks, academic groups, and research projects be meaningfully addressed and removed.

To achieve this, it is essential to recognize male privilege and the dynamics of male domination that continue to shape the labor market. Acknowledging these realities is a necessary step toward the development of equitable public policies capable of transforming the feminization of higher education into substantive progress in gender equity, rather than allowing it to remain a mere statistical increase with limited impact on the quality of life for women in Mexico. It is of little value for women to achieve high levels of education if their access, retention, and mobility within the labor market continue to relegate them to peripheral or semi-peripheral positions. Feminization cannot be understood solely as increased female participation in academia and science; it must be accompanied by a shift in the underlying paradigm. This requires rewriting the rules that currently govern the system, denaturalizing androcentrism, and promoting the positive feminization of the structures and norms that shape Mexico's scientific and labor institutions.

Translation: Erika Morales.

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