Breaking the gender barrier: a study on enrollment trends in medical specialties at the *Universidad Nacional Autónoma de México*

Michele de L Breda-Yepes, MD,[1] Carlos Garrido-Solano, MSP,[1] Viridiana Martínez-Miranda, MD,[1] Xana E Robles-Cacho, MD,[1] Arturo Abundes-Corona, MD,[2] Amin Cervantes-Arriaga, MD,[2] Teresita Corona-Vázquez, MD.[1,3]

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Abstract

Objective. To analyzes the gender gap among residents enrolled in the medical specialization program of the Graduate Division at the *Universidad Nacional Autónoma de México* (UNAM), *Facultad de Medicina*. **Materials and methods.** We conducted a descriptive observational study of students registered in all 78 medical specialties offered by UNAM over a period of 7 years (2015-2022) at approximately 161 hospitals in Mexico. **Results.** A total of 79 175 students were studied, we observed a predominance of women 51.69%, compared to 48.30% men. In medical specialties, we found a predominance of women of 57.33%, in contrast to surgical specialties with 44.76% women. The specialties with the most women enrolled were dermatology, neonatology, pediatrics, gynecology, and psychiatry. In men, the specialties with the most enrollment were general surgery, cardiology, neurosurgery, plastic surgery among others. **Conclusion.** Women predominance is observed in some medical specialties, but men predominance persists in surgical specialties.

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Resumen

Objetivo. Analizar la brecha de género entre los residentes inscritos en el programa de especialización médica en la División de Estudios de Posgrado de la Facultad de Medicina de la Universidad Nacional Autónoma de México (UNAM). **Material y métodos.** Estudio observacional que analiza las 78 especialidades médicas ofrecidas por la UNAM a lo largo de 7 años (2015-2022) en aproximadamente 161 sedes hospitalarias en México. **Resultados.** De 79 175 estudiantes de residencia, las mujeres representaron 51.69%. Las especialidades médicas (clínicas) mostraron un porcentaje más alto de mujeres (57.33%) en comparación con las especialidades quirúrgicas (44.76%). Ginecología, dermatología y neonatología ostentaron una representación femenina, mientras que cirugía general y cardiología favorecieron a los hombres. **Conclusión.** Existe un predominio de mujeres en algunas especialidades médicas, especialmente aquellas que requieren tareas de cuidado. Sin embargo, persiste una brecha

(1) División de Estudios de Posgrado, Facultad de Medicina, Universidad Autónoma de México. Mexico City, Mexico.
(2) Instituto Nacional de Neurología y Neurocirugía Manual Velasco Suárez. Mexico City, Mexico.
(3) Laboratorio Clínico de Enfermedades Neurodegenerativas, Instituto Nacional de Neurología y Neurocirugía Manuel Velasco Suárez. Mexico City, Mexico.

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Corresponding author: Teresita Corona-Vázquez. Laboratorio Clínico de Enfermedades Neurodegenerativas, Instituto Nacional de Neurología y Neurocirugía, Manuel Velasco Suárez. Insurgentes Sur 3877, La Fama. 14269 Tlalpan, Mexico City, Mexico.
email: coronav@unam.mx

ties, especially those that require caregiving tasks. However, a gap remains between men and women, particularly in surgical specialties and in higher decision-making positions. We suggest extending support networks to include men as well as women.

Keywords: gender role; internship and residency; education

entre hombres y mujeres, particularmente en especialidades quirúrgicas y puestos de toma de decisiones superiores. Es prioritario ampliar redes de apoyo existentes para incluir tanto a hombres como a mujeres.

Palabras clave: roles de género; residencias médicas; educación

In 1887, Matilde Montoya became the first Mexican woman to be awarded the degree of Medical Surgeon. Since this pioneering achievement, current statistics show that the outlook has changed, with more than 50% of medical students worldwide now being women, despite the multiple obstacles and difficulties they have encountered during the transition.[1] There is a wide scope of studies on higher education that clearly show the vertical and horizontal gender divisions that exist in higher education institutions, including teaching, administration, and research, as well as phenomena linked to discrimination, violence, and the impact of segregation at work.[1,2]

The main difference between horizontal and vertical segregation is that the former refers to women grouped together to perform activities linked to tasks considered to be of a "feminine" nature. As employment among women grows, horizontal segregation has increased, enabling long-standing stereotypes to remain. On the other hand, vertical segregation involves labor discrimination against women, preventing them from gaining access to jobs that involve taking on greater responsibilities, regardless of being fully qualified for them.[1]

Other terminologies used in this academic domain include gender equality, which refers to actions carried out to avoid exclusion and discrimination against individuals resulting from their gender identity, as well as unnecessary, avoidable, and unfair inequalities.[3] Gender bias refers to the misleading approach to inequality or supposed differences between men and women regarding their nature, behaviors, and/or overall reasoning, which may cause unfair behavior in the realm of medicine and research and is discriminatory between genders.[4] Finally, the gender gap refers to the distance that separates men from women regarding their rights and benefits and is considered one of the most evident signs of gender violence, as it excludes, limits, hinders, and prevents the exercising of their entitled rights.[3]

Research has been conducted in this academic domain, leading to the implementation of institutional policies that favor gender equality. For example, at the *Universidad Nacional Autónoma de México* (UNAM), work is being done to institutionalize and mainstream gender perspectives within their communities and substantial tasks.[1] In the 2020-2021 academic year, the university academic staff was represented by 55% men and 45% women, and in the field of research, 63% men and 37% women.[5]

The Faculty of Medicine at UNAM (FacMed) is a premier institution of higher learning in Mexico and one of the largest in Latin America, with a long and distinguished history over 430 years. In 2022, a total of 1 075 students successfully graduated from their medical degree in FacMed, of whom 701 (65%) were women and 374 (35%) were men, reflecting the increasing gender diversity within the medical profession.[6]

FacMed is also the leading institution for medical residency programs in Mexico, offering a broad range of 78 specialties across 161 teaching hospitals, as well as over 232 fellowship programs. With a diverse student population hailing from 19 different nationalities, the FacMed represents a vibrant community of students. During the last academic cycle, 4 000 residents completed their training at the faculty, with 2 138 (53.45%) women and 1 862 (46.55%) men, consolidating the faculty's preeminent position as the foremost institution in the training of both general practitioners and medical specialists in Mexico, and reflecting its unwavering commitment to producing outstanding health professionals.

As previously mentioned, both in our population and the rest of the world, women have been enrolling in universities and predominantly educating themselves as health professionals for decades. This has given rise to the term "feminization of medicine", which is used to give a feminine connotation to a name that lacks it and to the act of vesting a name that was originally masculine or neutral with a feminine gender.[7] It is worth noting that this phenomenon is increasingly observed at the undergraduate level and is also growing in postgraduate degrees.

Derived from the foregoing, science has always been mainly linked and represented by men, creating a strictly binary division.[8] Despite this, women have managed to penetrate the realm of higher education, causing increased participation in the academic, administrative, and research world. However, a gap remains between men and women. Women have always been

more prone to suffer gender violence in its diverse modalities, including psychological, physical, economic, and career-related.[9]

The underrepresentation of female specialist doctors and scientists in our country shows the urgent need to propose ways to reduce inequalities and close the gender gap. Women should be placed in higher positions that entail greater responsibilities and decision-making.

The objective of this study is to analyze the gender gap that has existed between male and female medical residents enrolled in the medical specialization program at the hospital campuses ascribed to the Postgraduate Division of the UNAM FacMed during the period of 2015-2022. The aim is to observe this phenomenon and compare it with the trends in other countries.

Materials and methods

A descriptive observational study was carried out of students registered in all 78 medical specialties offered by UNAM over a period of seven years (2015-2022) across an average of 161 teaching hospitals. The population was categorized by gender, institution, and medical, clinical, or surgical specialty, highlighting the most representative ones and analyzing the percentage gap between them. The information was obtained from the university database that is updated annually. All participants met the following criteria: a) enrollment in a specialty offered by UNAM's program; b) training in a hospital affiliated with our program; and c) Mexican or foreign students. Also, research of women in the international scene of medicine was carried out and described comparing to Mexico. No ethical approval was required since all information was collected from a pre-existing database, where we analyze the gender, the years, the institution, and the assigned specialty of the students.

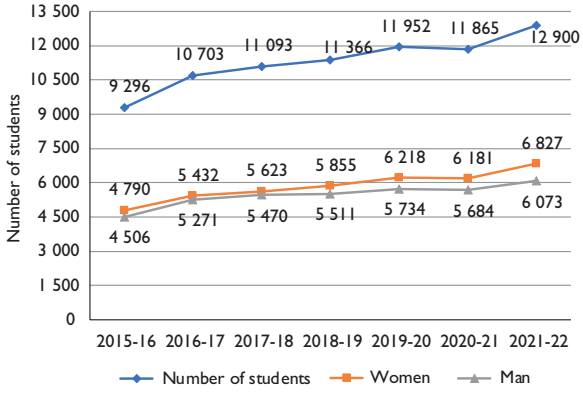
For the statistical analysis, quantitative variables were described with mean and standard deviation (SD). Qualitative variables were described using percentages. T-test for the slope of regression lines was used to analyze the difference and significance between slopes.

Results

During the period, a total of 79 175 students were studied. According to figure 1, for all the years studied (2015-2022) in all the specialties, there were 79 175 students. We observed a predominance of women, representing 51.69% compared to 48.30% of men (a difference of 8 percentage points). This tendency can be observed by the increase in women entering specialties. In 2015, 51.5% were women, whereas in 2022, 52.9% were women (an increase of 0.8 percentage points). This phenomenon seems more evident in medical rather than surgical specialties, as can be observed in the following graphs (figure 2 and 3), which shows an increase in the predominance of women enrolled in medical specialties, with 55.9% in 2015 and a rise to 57.33% in 2022 (an increase of 14.6 percentage points). This is not the case for surgical specialties, where women only represent 44.76% of the population studied (a decrease of 10.4 percentage points).

Analysis of the regression slope did not find a statistically significant difference in overall slopes (p=0.44). In addition, slope analysis for surgical specialties also failed to show a difference between women and men (p= 0.40). On the other hand, medical specialties did show a p-value of 0.043 which means slopes are in fact different favoring an increase on women in relation to men across time (figure 3).

When we analyze the surgical specialties, there is a predominance in men enrollment which becomes more evident in certain specialties that has been traditionally represented by males. For example, in 2022, women represented 33.88% in general surgery (a 32 percentage point gap), 24.16% in plastic surgery (a 50 percentage point gap), 29.82% in cardiothoracic surgery (a 44 percentage point gap), 7.14% in urology (a 85 percentage point gap), and 11.25% in neurosurgery (an 78 percentage point gap). However, within certain specialties, despite being surgical, most of the population is represented by women, as is the case for gynecology and obstetrics, as well as anesthesiology, where female predominance has remained since 2015 and has continue to increase in favor



Total for all years: Students: 79 175; Women: 40 926, 51.69%; Man: 38 249, 48.30%
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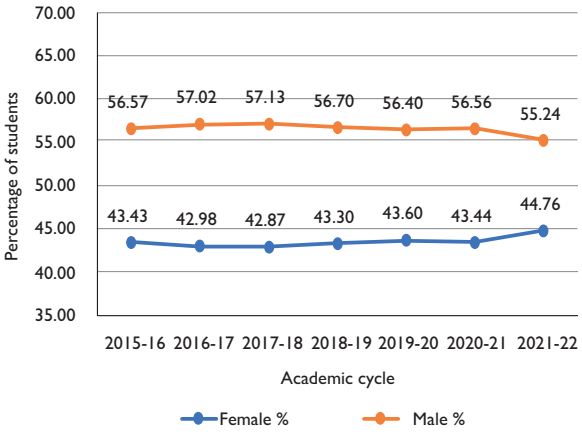
Figure 1. Total of students enrolled in the Faculty of Medicine Postgraduate Studies Division of the UNAM specialties in the total academic cycle from 2015-2022. Mexico



* Anesthesiology, Pediatric Anesthesiology, Angiology and Vascular Surgery, Cardiothoracic Surgery, Pediatric Cardiothoracic Surgery, General Surgery, Oncologic Surgery, Pediatrics Surgery, Plastic and Reconstructive Surgery, Coloproctology, Oncologic Gynecology, Gynecology and Obstetrics, Neuroanesthesiology, Neurosurgery, Pediatric Neurosurgery, Otoneurology, Ophthalmology, Neurological Ophthalmology, Orthopedics, Otorhinolaryngology, Pediatric Otorhinolaryngology, Radio-oncology, Neurological Endovascular Therapy, Urology, Gynecological Urology.
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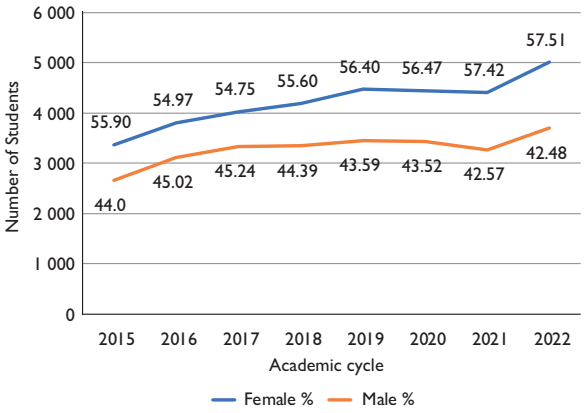
FIGURE 2. GENDER GAP OF STUDENTS ENROLLED IN SURGICAL SPECIALTIES* IN FACULTY OF MEDICINE POSTGRADUATE STUDIES DIVISION OF THE UNAM, MEXICO, IN THE TOTAL ACADEMIC CYCLE FROM 2015-2022



This graph illustrates a consistent increase of female residents over the years. Medical specialties: Clinical Allergy and Immunology, Clinical Pediatric Allergy and Immunology, Pathological Anatomy, Audiology, Otoneurology and Phoniatrics, Biology of Human Reproduction, Cardiology, Pediatric Cardiology, Dermatology, Pediatric Dermatology, Dermatopathology, Endocrinology, Pediatric Endocrinology, Epidemiology, Gastroenterology, Pediatric Gastroenterology and Nutrition, Genetics, Geriatrics, Hematology, Pediatric Hematology, Diagnostic and Therapeutic Radiology, Infectiology, Critical Medicine, Pediatrics Critical Medicine, Medicine of Physical Activity and Sports, Rehabilitation, Emergency Medicine, Occupational and Environmental Medicine, Family Medicine, Internal Medicine, Legal Medicine, Maternal-fetal Medicine, Nuclear Medicine and Molecular Radiology, Nephrology, Pediatric Nephrology, Neonatology, Pneumology, Pediatric Pneumology, Clinical Neurophysiology, Neurology, Pediatric Neurology, Neuropathology, Neuroradiology, Clinical Nutrition, Medical Oncology, Pediatric Oncology, Clinical Pathology, Pediatric Pathology, Pediatrics, Psychiatry, Child and Adolescent Psychiatry, Rheumatology, Pediatric Rheumatology.
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FIGURE 3. TRENDS IN CLINICAL MEDICAL RESIDENCY PROGRAMS, POSTGRADUATE STUDIES DIVISION, FACULTY OF MEDICINE, UNAM, MEXICO

of women during the last cycle of 2022, with 72.03 and 62.95%, respectively as shown in table I.

Within medical specialties, for the year of 2022, we found a female preference in the following areas of specialization: dermatology, with 78.5% (a 57 percentage point difference); neonatology, with 83.33% (a 66 percentage point difference); and pediatrics, with 71.58% (a 43 percentage point difference) (table I). On the other hand, there are certain specialties in which, despite the current outlook, male preference prevails, such as internal medicine, where 45.7% are women (a 9 percentage point difference); neurology, with 34.25% (a 31 percentage point difference); and cardiology, with 22.13% (a 56 percentage point difference), as can be seen in table I. Others remain with a narrower gender gap, such as diagnostic and therapeutic imaging, where 47.78% are women and 52.21% are men (a 4.5 percentage point difference) (table I).

Discussion

In the study described, we found that there are increasingly more women entering the field of medicine specially in the medical specialties comparing with surgical ones. We can observe the same trend in other countries, such as France and Spain, where approximately 62% of specialized doctors are women. However, male predominance persists in other countries like Canada, the United States, the United Kingdom, Colombia, and Brazil (table II).[10-16] Despite such encouraging facts, we cannot rely on the reduced gender gap and female roles, as women in decision-making positions still represent a much lower percentage than that of men. In Mexico, and in world literature, we have gathered that this gap continues to widen; women continue to be underrepresented, gender inequalities in the realm of science persist, and their impact on the lives of women is much greater due to the overload of caretaking jobs.[17] Despite this is not the aim of the study, we can see for example, in the United States, some European countries, and others in Latin America, this discrepancy remains highly evident existing 26.93% of women in Mexico as a third level in the investigators national system (SNI), and

Table I
Percentage of women and men in the most representative surgical and medical specialties in UNAM, comparing 2015 and 2022. Mexico

Surgical	*2015*		*2022*	
	Women (%)	*Men (%)*	*Women (%)*	*Men (%)*
Anestesiology	359 (62.22)	218 (27.78)	588 (62.95)	346 (37.04)
Cardiothoracic Surgery	18 (37.50)	30 (62.50)	17 (29.82)	40 (74.07)
General Surgery	126 (26.25)	354 (73.75)	266 (33.88)	519 (66.11)
Plastic Surgery	32 (29.63)	76 (70.37)	36 (24.16)	113 (75.83)
Gynecology and Obstetrics	422 (64.23)	235 (35.77)	657 (72.03)	255(27.96)
Neurosurgery	11 (11.58)	84 (88.42)	18 (11.25)	142 (88.75)
Urology	10 (8.70)	105 (91.30)	9(7.14)	117(92.85)
Medical				
Cardiology	38 (21.23)	141 (78.77)	56 (22.13)	197 (77.86)
Dermatology	85 (87.63)	12 (12.37)	110 (78.57)	30 (21.42)
Diagnostic and Therapeutic Radiology	155 (45.59)	185 (54.41)	270 (47.78)	295 (52.21)
Internal Medicine	338 (42.03)	466 (57.79)	640 (45.77)	758 (54.22)
Neonatology	77 (71.96)	30 (28.04)	105 (83.33)	21 (16.66)
Neurology	30 (46.15)	35 (53.85)	37 (34.25)	71 (65.74)
Pediatrics	537 (69.11)	240 (30.89)	771 (71.58)	306 (28.41)

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Table II
Percentage of women and men specialists in the following countries comparing to Mexico

Country	*Women %*	*Men %*
Canada (2019)[10]	38.8	61.2
United States (2019)[11]	36.3	66.7
Spain (2021)[12]	61.1	38.9
United Kingdom (2019)[13]	47.0	53.0
France (2021)[14]	62.0	38.0
Colombia (2013)[15]	30.0	70.0
Mexico (2021)	52.9	47.1
Brazil (2020)[16]	45.3	54.7

Public data available in each country

in Europe in a study made on 2021 there was 26.2%.[18] Therefore, despite the encouraging numbers we have gathered from our university regarding the reduced gender gap for women, we must remain vigilant for these numbers to be duly reflected within the research system and in the existing wage gaps.

Considerable limitations for women persist in 21st-century society, due to the social construct that demands women to place themselves in the caretaking role, which involves a series of activities as the main caretaker within the family and in society.

Several factors contribute to creating the construct that women have of themselves within the social environment, influencing decision-making where the options, including career-wise, still adhere to stereotypes. This explains why there is a certain affinity for specialties that require caretaking tasks within the medical community, such as pediatrics, gynecology and obstetrics, and neonatology, where the female population is more than 75% on average. This is a similar trend observed in other countries such as Canada, the United States, Spain, and Brazil.[10,12]

The male predominance exemplified in this study since 2015 is observed in certain specialties, such as internal medicine, radiology, urology, general surgery, cardiology, traumatology, and orthopedics, among others. However, it is important to highlight that this pattern initiated alongside the emergence of such specialties. As exemplified in the corresponding graphs,

we can visualize the start of a transition towards a more equitable gender gap.

In their career development, women are exposed to factors that influence their election criteria. For example, the caretaking role is prioritized as a social obligation, in which biological factors and those imposed by society have huge repercussions by causing dilemmas in the continuation or not of their academic degree. It is not an easy task to perform efficiently in these two aspects due to how highly demanding they are. The foregoing may be aggravated or simplified depending on their support networks and has repercussions, not only in the physical aspect but also in the emotional one, which involves constant discontent and guilt derived from failure to comply with requirements imposed by society regarding the role of being a mother, wife, daughter, sister, and even less so, with those required to be doctors. This situation triggers women to choose to occupy half-time or accumulated shift positions, mainly distinguished by having more flexible hours that allow them to develop activities of their personal life. In connection with the foregoing, performing for any of these positions tends to be interpreted as unattachment and a lack of commitment to the career, causing stigmatization, devaluation, disapproval, and discrimination towards those who seek to develop their careers in this category.

In the international literature, the phenomenon has been described as leaky pipelines, referring to gender inequality, which increases alongside the academic degree.[1] Derived from the results obtained from this study, it has been evidenced that the phenomenon exists in the medical specialties studied by the population and in scientific activities. In addition, a wage gap remains, which is derived from the extra jobs assumed by men within the very same health facilities, allowing them to perceive much greater incomes.

Despite the predominance of the male gender in decision-making positions or in certain medical specialties, it can also be subtly observed in some areas in which women have increased their participation, causing a reduction in the gender gap. The study of such data supports the described changes, which call for the harmonization of the involved sectors, in which the impact and importance of this transition has not been subject to questioning yet.

Conclusion

Even though the clear majority of gender roles and expectations are reinforced by society, it is imperative to create policies regarding work responsibilities in order to advance towards a more equitable vision of the roles of males and females within society.

On the upside, this outlook has created changes that are evolving towards an encouraging reality, spearheaded by women who have pushed for this transition despite facing adversity, and paved the way for new generations to follow. This involves not only the female gender but also the male. Therefore, we suggest extending the existing support networks between women and including men as well. Also, further studies are needed to analyze these aspects through years and observe the tendencies in broader teaching institutes in Mexico.

Declaration of conflict of interests. The authors declare that they have no conflict of interests.

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