

Women's empowerment in medicine and science

Redefining success

DORA INÉS MOLINA DE SALAZAR, JAIDER DE JESÚS CARO-SOTO • MANIZALES (COLOMBIA)

DOI: <https://doi.org/10.36104/amc.2025.3825>

Abstract

The article “Redefining success: Women’s empowerment in medicine and science” explores the transforming phenomenon of women’s empowerment in the fields of medicine and scientific research. The positive impact of this empowerment on diversity in scientific thinking is highlighted through a review of recent achievements, and marks an exciting and crucial chapter in the evolution of these disciplines.

A systematic PubMed search underscores the importance of evaluating gender equity in the work setting, showing that greater gender diversity is related to better work organization and better clinical outcomes in the healthcare system. However, challenges like the “glass ceiling” persist, limiting women’s progress in leadership roles due to ingrained social expectations.

The article suggests a change in the measure of scientific success, highlighting the need to consider quality over quantity in the metrics, since women tend to publish fewer articles, but of equal or higher quality. Despite advances in women’s participation in medicine and research, they still face obstacles in recognition, promotion and leadership, which is reflected in their lack of awards and participation in international conferences. (*Acta Med Colomb* 2025; 50. DOI: <https://doi.org/10.36104/amc.2025.3825>).

Keywords: *empowerment, woman, science, medicine.*

Dra. Dora Ines Molina De Salazar: MD, MPH, PhD, FACP. Profesora Titular, Facultad de Ciencias para la Salud, Universidad de Caldas; Dr. Jaider de Jesús Caro- Soto. Residente de Medicina Interna, Universidad de Caldas. Manizales (Colombia).

Correspondencia: Dra. Dora Inés Molina De Salazar. Manizales (Colombia).

E- Mail: doraines56@gmail.com

Received: 22/X/2024 Accepted: 12/XII/2024

Introduction

Over the last few years, medicine and scientific research have witnessed a transformative phenomenon: the growing and vital empowerment of women. This change challenges the gender barriers historically entrenched in these disciplines, giving way to a new era in which women assume leadership roles and redefine the standards of scientific success. As gender equity has become a social and academic imperative, female participation in medicine and research has expanded significantly.

This article embarks on a journey to explore the triumphs, challenges and significant contributions of women in these fields. From the operating room to research laboratories, women are leading innovative discoveries and challenging the established norms. The incorporation of new perspectives and approaches has enriched scientific thinking, showing that women’s empowerment is not only a social justice issue, but also a key driver of scientific progress. Through an analysis of the most recent advances, this article highlights the positive impact of greater inclusion of women in medicine and research, marking a crucial chapter in the evolution of these disciplines.

Method

For this study, a systematic PubMed search was done using the following MeSH terms: ((*empowerment*[Title/Ab-

stract]) AND (*women*[Title/Abstract])) AND (*medicine*[Title/Abstract])). Articles in English and Spanish from 1994 to 2023 were included. Articles with greater scientific rigor were prioritized, such as meta-analyses, systematic reviews, narrative reviews and high quality or widely cited studies.

Results

The PubMed search yielded a total of 45 results. The six articles with the most scientific weight, best quality and highest number of references were selected, most of them in English. Ample scientific output was found in the fields of medicine and social sciences, relevant for comprehensive patient management and education. However, a large proportion of the reviewed studies were derived from a medical setting, with limited female authorship.

Discussion

Numerous studies and theories have proposed different factors and stages for women’s empowerment. This is the case of Longew, who described five key stages: wellbeing, access, knowledge, participation and control (1). On the other hand, Kayanighalesard and Arsalanbod indicated that female empowerment seeks to improve women’s financial, cultural and social position. They also emphasized the importance of education, expanded medical insurance and the creation of home employment in this process (2).

Despite advances in gender equality and female empowerment, the presence of women in scientific leadership roles continues to be limited. The barriers they face throughout their careers arise from both social prejudice as well as the prevailing scientific culture. This study explores these challenges and their impact on scientific output and recognition (3).

Glass ceiling

The obstacle to women advancing in science is the “glass ceiling,” a term that refers to the resistance women (and other minorities) encounter when they try to reach higher management levels in organizations. One determining factor in this phenomenon is the social role traditionally assigned to women, which dictates acceptable sex-specific patterns of behavior. Naturally, men are expected to be the main financial support in the home and women are given the responsibility of caring for the family.

These social expectations influence the work setting and organizational culture, which continues to favor traditionally male characteristics, making leadership positions more attractive to and accessible for men. One of this culture’s inherent obstacles for women in this setting is the impact of pregnancy on their professional development. Pregnant women, those who plan to get pregnant or those who have recently had children often face negative consequences in their fields, such as contract termination, being passed over for promotion due to the implicit expectation that they will need to request more time off for maternal responsibilities, and, in some cases, unilateral salary reduction (3,4). Many times, this forces them to choose between their professional growth or their maternal role (5).

Changing the measure of scientific success

Scientific success is generally measured through bibliometric indicators, like the h-index. However, there is growing discontent with these metrics in the scientific community, as they largely focus on the quantity of publications rather than the quality. This system puts women at a disadvantage, as it has been shown that they publish fewer articles, on average, than their male colleagues over the course of their scientific careers. Nonetheless, the studies suggest that articles published by women tend to be of higher quality than men’s, which indicates that women’s lower productivity is not due to less aptitude. Incorporating this knowledge into academic success metrics, to reflect this reality, could help level the playing field for female scientists.

This change is framed within a global trend that goes beyond metrics, known as “Science in Transition” (4). Despite increased female involvement in medicine, science and research, women continue to be less likely to be recognized as leaders and experts in their fields. They are also less likely to receive awards, be promoted to leadership positions or participate in international medical conferences (6).

An article by Chatterjee and Werner presented a review of academic articles written by women and men in high impact scientific journals. Articles written by women were found to be less cited than those written by men, especially when all the main authors were women. This citation gap can negatively affect female scientists’ recognition and academic progress, contributing to persistent gender inequality in scientific output.

This study’s findings (summarized in Table 1) show that, out of a total of 5,554 articles reviewed, only 1,975 (35.6%) had a woman as the main author. Furthermore, in the 4,940 articles with multiple authors, only 1,273 (25.8%) had a woman in the role of main author. The authors also found that most studies were original research articles [3,354 (60.4%)], while the rest were commentaries [2,200 (39.6%)]. As far as the journals, most of the analyzed articles were published in *JAMA* [1,644 (29.6%)] and *NEJM* [1,605 (28.9%)] during the study period (7).

Ioannidou et al. emphasized that gender inequality in science, medicine and dentistry continues to be a main concern within the biomedical research workforce today. Although advances have been made in inclusion and gender diversity, growth has been slow. Women continue to face multiple barriers to achieving a higher rank and leadership positions, while also trying to maintain overall success in these fields.

Increasing involvement

One stage of female empowerment is understanding the current status of society and science, which creates greater awareness of the need for equity, cooperation and equal involvement. However, the latter is not sufficient on its own; it must be effective and significant. Its main objective is to ensure equitable involvement of half of the population, allowing useful and constructive ideas to be harnessed and disseminated.

In this regard, Bonilla et al. (8) indicated that women’s involvement in decision making is a key factor in their empowerment. Kabeer, (9) in turn, links this empowerment process to the role women play in society. Despite the limitations imposed by social norms, self-confidence, self-esteem, female empowerment and discipline are essential elements in this stage, even more than women’s intellectual quotient.

To overcome these barriers, female participation in the authorship of scientific papers must be increased. This can be achieved by promoting women’s inclusion both as research subjects as well as in academic leadership, journal editing and editorial board membership roles. The article by García-Aguilar, D., (10) highlights the role of female empowerment in academic and scientific settings, especially in the context of medicine and public health in Peru. The study examines the evolution of female participation in the authorship of scientific articles published in this journal over two decades, finding increased visibility and contributions from women in scientific knowledge output.

On the other hand, strengthening leadership abilities in clinical and scientific settings is essential. Based on a systematic review of the literature, Fichera et al. demonstrated the limited role of women in mentoring, as well as the under-representation of female leaders in these fields (11).

Influential women in science

Throughout history, women have made essential contributions and discoveries that formed the process of various scientific fields. In genetics, Rosalind Franklin played a crucial role in discovering the structure of DNA, thanks to her experience in X-ray crystallography. Her famous "Photo 51," along with their own data, was essential for James Watson and Francis Crick's publication of their double-stranded helix model in 1953. However, her contribution was only recognized posthumously in Watson's memoirs in 1968 (12, 13).

Another prominent figure was Barbara McClintock, a 20th-century American cytogeneticist who is still the only woman to have received an unshared Nobel Prize in Physiology or Medicine. Her pioneer work in cytogenetics led to the discovery of "mobile genes," although her research was initially met with skepticism in the 1950s. It was not until the end of the 60s that the scientific community recognized the significance of her discovery. The history of science is full of similar examples of women who, after facing countless obstacles, prospered and achieved significant advances in their respective fields (14).

Women in the healthcare field must be empowered and achieve changes in both clinical practice and academia. Women have proven to be a central pillar of society and the family, with qualities like empathy, discipline, respect and agility which, combined with medical knowledge, translates into better patient care, with more accurate diagnoses and treatment (15).

Conclusion

In conclusion, women's empowerment in medicine and science is a transformative phenomenon that has had a positive impact on the diversity of scientific thought and the quality of medical care. However, challenges (such as the glass ceiling) remain, limiting women's advancement in leadership roles. To overcome these challenges, the measure of scientific success must be changed, emphasizing quality over quantity. It is also important to promote gender equality in the workplace, eliminating barriers that prevent women from advancing in their careers.

With these changes, women can fully contribute to the advance of representativity in medical and scientific practice, which will benefit all of society.

References

- Longwe, S. H. (1995). *Empowerment: A framework for analysis of women's position in development*. Development Policy and Practice, 3(2), 1-12.
- Kayanighalesard S, Arsalanbod MR. Economic Empowerment of Women, according to the Experience of Japan. *National Conference of Women and Rural*

Table 1. Comparative chart of articles written by women and men.

Characteristics	Articles, N° (%) (N = 5,554)
First author	
Female	1,975 (35.6)
Male	3,579 (64.4)
Main author	
Female	1,273 (25.8)
Male	3,667 (74.2)
Year	
2015	1,449 (26.1)
2016	1,339 (24.1)
2017	1,384 (24.9)
2018	1,382 (24.9)
Journal	
Annals of Internal Medicine	526 (9.5)
BMJ	937 (16.9)
JAMA	1,644 (29.6)
JAMA Internal Medicine	842 (15.2)
NEJM	1,605 (28.9)
Type of article	
Original research	3,354 (60.4)
Commentary	2,200 (39.6)
Abbreviations: BMJ: The British Medical Journal; NEJM: The New England Journal of Medicine. Source: Chatterjee & Werner (7).	

Development, Ferdowsi University of Mashhad. 2014

- Merens A, Bucx F. Werken aan de Start. Jonge vrouwen en mannen op de arbeidsmarkt. *Sociaal en Cultureel Planbureau*; 2018.
- Bots SH, Zuidgeest MGP, Gohar A, Eikendal ALM, Petrelli A, van Os-Medendorp H, et al. Women in Translational Medicine: Tools to Break the Glass Ceiling. *Frontiers in Medicine*. 2018;5:330.
- Greider CW, Sheltzer JM, Cantalupo NC, Copeland WB, Dasgupta N, Hopkins N, et al. Increasing gender diversity in the STEM research workforce. *Science*. 2019;366(6466):692-5.
- Molina de Salazar DI, Ferreira ÁP. Papel de la mujer en el desarrollo de la ciencia y la investigación clínica. *Revista Colombiana de Cardiología*. 2023;30(3).
- Chatterjee P, Werner RM. Gender Disparity in Citations in High-Impact Journal Articles. *JAMA Network Open*. 2021;4(7):e2114509.
- Bonilla, J., Zarzur, R. C., Handa, S., Nowlin, C., Peterman, A., Ring, H., & Seidenfeld, D. (2017). Cash for Women's Empowerment? A Mixed-Methods Evaluation of the Government of Zambia's Child Grant Program. *World development*, 95, 55-72. <https://doi.org/10.1016/j.worlddev.2017.02.017>
- Kabeer, N. (1999). *Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment*. Development and Change, 30(3), 435-464.
- García-Aguilar, D., Heredia-Mimbela, I., & Pereyra-Elías, R. (2019). Autoría femenina en la Revista Peruana de Medicina Experimental y Salud Pública: análisis del periodo 1997-2017. *Revista Peruana de Medicina Experimental y Salud Pública*, 36(4), 601-609.
- Fichera G, Busch IM, Rimondini M, Motta R, Giraudo C. Is Empowerment of

- Female Radiologists Still Needed? Findings of a Systematic Review. *Int J Environ Res Public Health*. 2021 Feb 5;18(4):1542. doi: 10.3390/ijerph18041542. PMID: 33562881; PMCID: PMC7915271.
12. **Braun G, Tierney D, Schmitzer H.** How Rosalind Franklin Discovered the Helical Structure of DNA: Experiments in Diffraction. *The Physics Teacher*. 2011;49(3):140–3.
13. **Tobin MJ.** April 25, 1953: three papers, three lessons. *American Journal of Respiratory and Critical Care Medicine*. 2003 Apr 15;167(8):1047–9.
14. **Elbardisy H, Abedalthagafi M.** The History and Challenges of Women in Genetics: A Focus on Non-Western Women. *Frontiers in Genetics*. 2021;12.
15. **Molina de Salazar DI, Betancur-Acevedo LF.** Empoderamiento de la mujer médica. *Revista Colombiana de Cardiología*. 2024;31(2):75-77.

