

IFMSA Policy Document

Gender Representation in Medical Curriculum and Research

Proposed by the IFMSA Team of Officials

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Policy Statement

Introduction

Gender representation in medical education and research plays a vital role in ensuring equitable health outcomes between different genders. The content covered in medical curricula and the inclusion of different genders in research can significantly contribute to people's access to care. This policy will explore the current disparities that exist in medical research and curricula and the impact of these disparities, justifying the need to promote diverse and equitable gender representation.

IFMSA Position

The International Federation of Medical Students' Associations (IFMSA) recognises the current gender representation and participation gap in medical education and research. It is important to emphasise that this inequity not only affects the professional development of individuals but also compromises the population's health.

Women, intersex individuals, trans people and non-binary people not only have to contend with legal and financial barriers that often limit them from achieving their full potential due to patriarchal structure. Many were still asked to also balance their professional development with caregiving roles associated with their gender and other obstacles such as sexual harassment and discrimination.

Addressing these systemic issues is not just a matter of gender equity; it is essential for fostering innovation, improving healthcare outcomes, and ensuring that medical practices meet the diverse needs of all individuals.

Call to Action

Therefore, the IFMSA calls on:

Governments to:

- Institute policies and institutional practices that promote equitable opportunities and gender-equitable representations in all phases of research.
- Foster programs that boost leadership, providing opportunities for professional development and mentorship for groups oppressed by the patriarchal system.
- Implement regular audits and assessments of research practices to ensure ongoing adherence to gender-inclusive protocols and adjust strategies to address identified disparities.
- Increase funding for research on gender-specific health issues and disparities, with special attention to trans people and intersex individuals.

International Organisations and NGOs to:

- Advocate for standardising gender-inclusive data collection methods across research institutions and projects.
- Highlight the work carried out by women and other people discriminated against in the patriarchy in science.
- Foster international collaboration to share best practices and resources for addressing gender disparities in medical education and research.

Academic faculties and medical schools to:

- Integrate gender perspective training into educational and training programs to raise awareness within the scientific community about equitably addressing health issues in women, men and non-binary people.

- Integrate reliable education on topics of sexual health, especially on the issues of sexually transmitted infections, based on evidence, not preconceptions and stereotypes.

The scientific community, including researchers and entities to:

- Ensure an inclusive recruitment process that encourages the equitable participation of women, non-binary people, intersex individuals and trans people in clinical trials and research studies.
- Acknowledge and address the lack of research on specific health issues experienced by women, non-binary people, intersex individuals, and trans people, and utilise existing and necessary resources to address them.
- Encourage collaboration among researchers from diverse disciplines to address gender aspects in medical research comprehensively.
- Allocate specific financial and logistical resources for researching health issues that predominantly affect different genders, ensuring comprehensive care for all genders.
- Develop research related to and policies that enforce equitable gender representation in specialities, leadership, and research positions.
- Standardise data collection methods to monitor and analyse gender representation at all levels of the medical field.

Medical students and IFMSA National Member Organizations to:

- To promote awareness about inequities in gender representation in medical curriculum and research and their health and educational impacts.
- To empower medical students to identify the gaps, inequities, and discriminatory behaviour and advocate against them.
- Establish a secure and empowering atmosphere for women and people of diverse gender presentations and identities locally and nationally.
- Invest in initiatives that reduce the barriers for people in minorities to engage in their local and national opportunities actively.
- To expand the activities and advocacy on capacity building for medical students to increase competencies, including research and leadership skills, for achieving inequitable gender representation in medical students.
- To collaborate with educational facilities to establish and provide opportunities for women's engagement in medical curriculum and research.

Position Paper

Background information

Definitions

- **Gender:** Gender encompasses socially defined roles, characteristics, and opportunities considered appropriate for men, women, boys, girls, and non-binary individuals. Interpersonal relationships also shape and reflect power dynamics. It is not a static concept; it involves over time and across different contexts. [1]
- **Gender bias:** Discriminatory behaviours or beliefs stemming from the biased notion that individuals who are not cisgender men are not inequitable to men in terms of rights and dignity. [2]
- **Gender gap:** Disparities between cisgender men and individuals of other genders in various aspects, including their levels of involvement, access, rights, compensation, or advantages. [2]
- **Career breaks:** A crucial mechanism for facilitating the balance between work, personal, and family responsibilities. [2]

Overview of gender representation in medicine and science

The presence of women in the field of medicine has been evident since ancient times. However, access to medical schools was much later. Some of the first women to graduate as physicians, such as Elizabeth Blackwell, Maude Abbot, Honoria Acosta, or Edma Abouchdid, gained admission to university in the late 19th century. According to the latest report published by the Organisation for Economic Cooperation and Development (OECD), consisting of 38 member states, the number of women physicians has increased in recent years, accounting for almost half of all registered doctors in the organisation's member states. [3,4]

Concerning other scientific fields, and according to the Information released by the UNESCO Institute for Statistics (UIS), less than 30% of researchers globally are women. Moreover, various studies indicate that in STEM fields (Science, Technology, Engineering, and Mathematics), women publish fewer articles, receive lower compensation for their research, and do not progress in their professional careers at a level comparable to men. [5]

Over the years, gender disparity has been evolving, with the number of women academics increasing in the last 60 years. However, despite the potential of this rise in the number of women in the field to address the existing gender gap, paradoxically, it has seen an increase in different areas, such as authorship of articles or career development. For instance, in terms of the number of publications, men average 13.2 articles throughout their professional lives, while women reach only 9.6, resulting in a 27% gap. [6]

The low representation and participation of women in the field of science are not only reflected in this area but also extend to many other sectors. This includes holding organisational leadership positions, participating in decision-making, and even representation in clinical trials.

On the other hand, the underrepresentation of individuals with non-binary gender identities, as well as trans and intersex individuals, is evident in the absence of scientific literature addressing specific health issues.

Discussion

Gender representation: data and current situation

a. International organisations and global governance

The participation of women is essential in worldwide governance. Research indicates that when women participate in political decision-making, the laws formulated have a more significant impact on the population, as well as on the environment and social cohesion. However, women's presence in this field remains low: of the 193 Member States that make up the United Nations, only 34 women hold the position of Head of State or Government, and they occupy only 21% of ministerial positions, 26% of parliamentary seats, and 34% of government seats. Even within the United Nations, only four women have been elected as Presidents of the General Assembly over 75 years. [7]

There has been a notable increase over the years regarding participation in various types of organisations, specifically those related to science and health. Nevertheless, the representation of women in leadership roles persists to be much lower than that of men:

The World Health Organisation Executive Board (WHO EB) comprises 34 members, of whom only 11 are women, representing approximately 32%. [8]

This low representation of women in international organisations related to health is observed in various entities such as the World Medical Association (WMA), World Psychiatric Association (WPA), World Federation of Medical Education (WFME), and World Federation of Societies of Anaesthesiologists (WFSA, where none of them reach 50% of positions held in their Executive Committees. [9–12]

b. Academic faculties

Across history, academia, a significant avenue for attaining power and securing tenured careers, has been predominantly controlled by white men. It wasn't until 1892 that Alice Palmer broke this trend by becoming the first woman to assume leadership at the University of Chicago. Since then, progress has been made in enhancing gender diversity in academic leadership, though the pace has been gradual. Typically, more women occupy untenured positions like instructors and assistant professors, but a glass ceiling persists for top-tier roles such as college president and provost. [13,14]

While there has been an increase in the presence of women in academic leadership, men continue to occupy a more significant proportion of the top administrative roles. As per a 2017 American Council on Education study, approximately 30% of college presidents are women, constituting around 30% of college board directors. [15]

c. Curriculum development [16,17]

The curriculum development is essential to educational equity and inclusivity. The individuals responsible for designing and shaping academic curricula, such as curriculum developers, subject matter experts, policymakers, and educators, play a crucial role in determining educational programs' content, perspectives, and methodologies. Historically, there has been a gender imbalance in the field of education, with men often dominating leadership roles and decision-making positions. However, over the years, efforts have been made to address this disparity and promote greater gender diversity and representation in shaping academic curricula.

It is widely recognised that diverse perspectives contribute to a more comprehensive and inclusive educational experience. When individuals from different genders, backgrounds, and identities are involved in curriculum development, a broader range of perspectives and experiences can be incorporated, leading to more balanced and representative educational materials.

Promoting gender representation in shaping academic curricula can foster an environment that supports equality, empowers students from all genders, and prepares them for a more inclusive society.

Sex- and gender-based medicine has been defined as “a study of the differences in men’s and women’s normal function and in their experience of the same diseases,” according to Marianne Legato [18]. Despite its critical importance, sex- and gender-specific medicine remains neglected in the academic arena, with information related to sex- and gender-related biomedical aspects being inconsistently incorporated into medical education.[19]

In the process of shaping medical curricula, it is crucial to integrate content that reflects the diversity of gender-related health issues, ensuring that students acquire a nuanced understanding of how biological and sociocultural factors intersect in patient care. By incorporating topics such as women's health, LGBTQ+ health, and gender-specific variations in disease presentations, the curriculum becomes more comprehensive. [20–22]

d. Medical specialities [13,23–25]

Gender representation in medical specialities can vary significantly. While progress has been made in recent years, gender disparities persist in certain areas. Here is a general overview of gender representation in some medical specialities:

- **Surgery:** Historically, surgery has been predominantly men-dominated, but an increasing number of women are pursuing surgical careers in recent years. However, women remain underrepresented in many surgical specialities, particularly in fields like orthopaedic surgery, neurosurgery, and cardiothoracic surgery.
- **Paediatrics:** Pediatrics has a higher representation of women than other specialities. Many women choose paediatrics for patient care, child advocacy, and work-life balance.
- **Obstetrics and Gynecology (OB/GYN):** OB/GYN has more women than other specialities. The nature of the speciality, which focuses on women's reproductive health, may attract more women to this field.
- **Internal Medicine:** Internal medicine encompasses many subspecialities, and gender representation varies. While some subspecialities, such as cardiology and gastroenterology, have historically had a lower representation of women, others, like rheumatology and endocrinology, have a higher proportion of women.
- **Radiology:** Radiology has seen an increase in the representation of women in recent years. The field offers an excellent work-life balance and the opportunity to combine technology with patient care.
- **Anesthesiology:** Anesthesiology has a relatively higher representation of women than other specialities. The field is known for its flexible work hours and the ability to balance clinical work with research and academic pursuits.

It is important to note that these observations are general trends and may vary across different countries and regions. Additionally, gender representation can change over time as more efforts are made to promote diversity and inclusion in medical specialities.

Barriers to gender representation

Gender-related barriers hamper individuals’ abilities to achieve success in medical research and leadership. [26,27]

A range of potential barriers regarding perceptions of capability, capacity, and credibility can be identified. Self-doubt, lack of self-confidence, and underestimation of personal capabilities lead to doubt among several women suited to medical leadership roles. Another frequently cited barrier is parenthood, viewed as an inherent incompatibility. [26]

Assumptions are made for some roles being incompatible with part-time work, and men assume not having primary childcare responsibilities places them at a comparative advantage.

a. Institutional culture and discrimination

At the institutional level, senior staff and leaders offer limited support for flexible options and work-life balance. The male counterparts particularly emphasise fitting in and just doing a job rather than discussing or advocating about work-life balance. [26]

Medical institutions may still have institutional barriers that favour traditional gender roles despite progress. Biassed hiring practices, inequitable distribution of opportunities, and a lack of recognition for women's achievements are manifestations of these cultural norms. Women professionals may need more advancement opportunities due to discriminatory attitudes influencing decision-making processes. [27,28]

Subtle biases, such as those in evaluations, promotions, and mentorship, can negatively impact women's careers. Implicit bias, which is rooted in societal norms, may undervalue women's skills and contributions. Raising awareness and implementing crucial training programs to mitigate these biases, creating an inclusive institutional culture.

b. Gender stereotypes

In medical leadership, women often confront expectations to conform to traditional gender norms, where qualities perceived as too feminine may be dismissed. This dynamic not only places undue pressure on women to alter their behaviour but also contributes to a gendered work environment, making it alienating and uncomfortable for female professionals.

Gender stereotypes impacting specialisation influence the perception of which medical specialities suit men or women. Women may face resistance or scepticism when pursuing specialities that men have traditionally dominated. This contributes to an unequal distribution of medical disciplines, restricting the diversity of expertise within various fields. Stereotypes can also impact the recognition of women's achievements, creating fewer opportunities for promotions and leadership roles. Challenging and dismantling these stereotypes is crucial to ensure that individuals are assessed based on their skills, competencies, and contributions rather than relying on assumptions related to gender. [29]

c. Work-life balance

Social expectations frequently assign the primary responsibility for caregiving to women, both at home and in the workplace. The demanding nature of medical careers only worsens the challenge as women struggle to balance long working hours with family responsibilities. This imbalance discourages women from pursuing or advancing in medical careers. [30]

To overcome this obstacle, medical institutions must introduce supportive policies such as flexible working hours, parental leave for all parents involved in child care, and childcare facilities. By cultivating a culture that acknowledges and accommodates diverse family structures, institutions can create an environment where parents can excel professionally without sacrificing personal commitments.

Most studies have demonstrated the work-life balance as one of the most significant challenges for women. In a study, men and women mentioned balancing family and work responsibilities as one of their struggles. Still, 55.9% of women and 42.6% of men have selected this matter as an obstacle in their career. There is social pressure on women to be the primary caregivers of the family and children through heteronormative gender roles, which cause women to undertake part-time work and women's preferences for specific specialities. Research indicates that even with the growing number of women joining the medical field, women still work an average of 8.5 hours longer at home per week than men. Compared to women, married men with children put in 7 more hours at work and 12 fewer hours a week on household chores and parenting. [31,32]

d. Other gender gaps

Sexual harassment and gender discrimination are other obstacles that people of various genders, especially women, trans men and non-binary people in medicine, have claimed. In academic medicine, over 30% of postdoctoral students reported having directly experienced harassment; percentages were much higher for women of colour. In addition, studies show that academic medicine has almost twice as many cases of sexual harassment as other research and engineering fields. According to research published in April 2019 in the *Annals of Surgery*, sexual harassment occurs in surgical training, but it frequently goes undetected. Women in surgery also often experience discrimination, sexual harassment, and incorrect assumptions about their talents. A woman may leave a career or institution due to unpleasant comments, sexist insults, inappropriate actions, putdowns, and implications that women don't belong in a particular field or setting. These behaviours can also cause depression and contribute to decreased productivity. [33,34]

Salary inequity and loan payment are other factors related to women's barriers in pursuing medical research compared to cisgender men. According to the Association of American Medical Colleges (AAMC) report, there are gender differences in pay in most clinical science fields, with the most significant disparities occurring at the highest leadership levels. [33,34]

Gender participation and impact on health

According to the WHO definition, "*clinical trials are a type of research that studies new tests and treatments and evaluates their effects on human health outcomes*". [35]

Individual participation allows for a representation not only of the individuals themselves but also of local communities. Race, ethnicity, age, and sex can influence the varying responses of individuals to the same medication or treatment; this underscores the significance of diversity in participants within clinical trials. [36] According to scientific evidence, it is crucial to take into account sex as a variable when conducting research, as differences are observed in terms of prevalence, diagnostic methods, and primary clinical signs, as well as discrepancies in severity and treatment outcomes. [37]

However, several studies indicate that the participation of women and girls in clinical trials is significantly lower than that of men. In this regard, there is no literature analysing participation rates globally; however, this disparity is evident in studies conducted by various countries:

- **Study 1:** Primavera Spagnolo and her colleagues analysed data from *ClinicalTrials.gov* over four years (2016 – 2019) and found that, on average, 41.2 percent of participants in clinical trials were women. This is lower than the percentage of women affected by certain diseases; for example, although 49 per cent of the cardiovascular disease patient population is women, only 41.9 percent of trial participants were

women. Spagnolo emphasised the importance of aligning clinical trial populations with the demographics of the population affected by the disease to ensure that the results of clinical research benefit all individuals. [38]

- **Study 2:** Gender bias plays a significant role in shaping the trajectory of scientific research, affecting choices in research topics and sample selection. This bias often results in a limited understanding of individuals assigned female at birth biology beyond reproductive aspects, as research focuses on cisgender men. Historically, the assumption that men, devoid of menstrual cycles and pregnancy, make ideal test subjects has prevailed. This is evident in the inequitable allocation of funding for coronary artery disease research, where despite a higher morbidity and mortality rate among at-risk women, men receive disproportionately more funding. Gender bias extends to the realm of symptom treatment, as doctors, influenced by stereotypes, may impede individuals, particularly women, from receiving appropriate care. A 2018 study revealed that men chronic pain sufferers are often perceived as "brave" or "stoic," while their women counterparts are labelled as "emotional" or "hysterical," resulting in delayed diagnoses. In 2019, a study found that women waited longer for diagnoses in 72% of cases compared to men, underscoring the pervasive impact of gender bias on healthcare outcomes. [39]
- **Study 3:** In examining gender disparities in clinical trial participation among 6544 African Americans, findings revealed that 41.6% were men, with an average age of 43.1 years. A significant majority, nearly 80%, possessed at least a high school education, and 82.4% were unmarried, while 65.0% were unemployed. Notably, 92.4% of all participants expressed definite or potential interest in joining a research study; however, only 15.2% had prior experience in health research studies. A noteworthy observation was that a higher percentage of women had participated in health research compared to men (17.3% vs. 12.3%, $p < 0.0001$), and they exhibited greater overall interest in participation (93.0% vs. 91.7%, $p = 0.0469$). [40]

The lack of information in clinical trials can occur in two ways: on the one hand, diseases that exclusively or primarily affect people assigned women at birth may itself lack sufficient research due to the lack of interest and limit from the application point of view; on the other hand, diseases that affect both men and women may not have adequate women representation, as seen in the case of lung cancer or vascular diseases. Additionally, some conditions impact men and women differently, as is the case with AIDS. [41]

The same misinformation may be found in medical textbooks, which solely use white, heterosexual men as a model and include women only in reproductive health and epidemiological data. [42] As a result, there is a significant disparity in the descriptions of depression and alcohol abuse in women. Even in fundamental subjects, such as pharmacology, gender differences are not considered. [43]

This results in a 'men model' of medicine, which fails to address the specific needs of women and is inadequate for them. The negative consequences can be observed in different factors, such as morbidity and mortality and patterns of diagnosis. [41,44]

Furthermore, there is gender bias found in the funding of research on specific diseases. Some studies show that diseases primarily affecting women receive insufficient funds, whereas those mostly involving men not only receive adequate funding but, in some cases, are even considered "excessive". [45]

- a. **Conditions that exclusively or primarily affect individuals assigned female at birth: Gynaecological Cancers [46]**

Research on women's health receives significantly less funding than the financial support allocated to conditions that predominantly affect men, as revealed by a recent analysis of data from the US National Institutes of Health (NIH).

Diseases that exclusively affect individuals assigned to females at birth may receive varying levels of funding depending on factors such as disease prevalence, severity, and public awareness. Medical issues like breast cancer, ovarian cancer, and cervical cancer have historically received significant attention and funding due to their impact on women's health. Several organisations and initiatives focus on these diseases and contribute to research funding. However, it's important to note that the funding levels can still vary, and some diseases that predominantly affect women may receive comparatively less funding. Research indicates that in almost 75% of cases where a medical condition primarily impacts one gender, the funding distribution tends to favour cisgender men. This means that either the disease affects more women and receives inadequate funding relative to its burden, or the disease affects more men and is disproportionately overfunded.

b. Conditions that exclusively or primarily affect individuals assigned female at birth: Endometriosis

One of the best examples of gender inequality in medicine is endometriosis. It is a condition caused by endometrial cells occurring outside of the uterus and is approximated to impact approximately 10% of individuals assigned female at birth in their reproductive age globally. [47] Despite extreme commonness, no specific markers or diagnostic standards exist, resulting in a 4–11-year diagnostic delay and at least one false diagnosis in 74% of cases. Even though the primary symptom of endometriosis is not particularly specific—heavy abdominal pain during menstruation—the social complexity of the causes of incorrect diagnoses is greater. Social stigma plays a significant role in the delay in diagnosis. For example, parents of patients under the age of 18 are reluctant to discuss menstruation with their children, even if they are in severe pain. Doctors tend to minimise the symptoms of older patients by downplaying the difficulties faced by these patients and invoking clichés to justify their suffering, such as "that's just the way you're built; get used to it" or "pain will go away after birth." [48] Delays in

diagnosis in endometriosis are a medical phenomenon because they happen regardless of the state of the healthcare system in the nation. [49] Patients may have an increased risk of infertility, myofascial pain, central sensitisation, and chronic pelvic pain as a result. These conditions require multidisciplinary therapy, which is more expensive for the patient and society. [50] Additionally, compared to the private sector, the public sector has a 2.5 times lower likelihood of administering opioid painkillers and a 3.7 times lower probability of doing laparoscopies, which are now the sole diagnostic tool available. [51] These findings highlight significant economic inequities.

c. Conditions that affect both men and women: Cardiovascular Disease [45]

Diseases that affect both women and men, such as cardiovascular disease, diabetes, and certain types of cancers, often receive substantial research funding due to their high prevalence and significant impact on public health. These conditions receive attention and resources from various research organisations, government agencies, and nonprofit foundations. The funding for diseases that affect both genders is typically aimed at understanding the underlying causes, improving prevention and treatment strategies, and enhancing overall patient outcomes. However, gender bias was still found in the gender of the patients who participated in the clinical research.

Just 27% of the pooled population in 258 clinical trials on cardiovascular disorders consisted of women. [52] Due to the lack of clinical data, invasive procedures like coronary angioplasty and coronary artery

bypass surgery are performed less frequently, and women are getting their diagnoses later than men. [53]

Additionally, there are differences in the effectiveness of the treatments, which should take gender into account. Men who take low doses of aspirin may experience a decreased risk of myocardial infarction and ischemic stroke; however, women appear to respond differently to these medications, with some randomised trials showing no benefit at all[54] or even harm, as seen by more recent studies. [55]

Furthermore, women are less likely than men to receive cardiopulmonary resuscitation assistance in the event of a cardiac arrest outside of private settings, such as a hospital or home. According to a University of Pennsylvania analysis, just 39% of women will receive bystander cardiopulmonary resuscitation, compared to 45% of men. [56]

A survey backed by the Center for Women's Health Research revealed that the sexualisation of bodies is the primary cause of the decline in assistance for women. Participants expressed that they are concerned about accusations of sexual harassment and nonsexual assault because women's bodies are "more fragile" and, hence, more easily harmed. The third cause, shown in the survey, is misconceptions about women's health, which are founded solely on preconceptions, not evidence-based knowledge. These myths claim that since women do not experience cardiac arrest, their state of being unconscious on the street is hysteria, which will pass on its own without the assistance of bystanders. [57]

d. Conditions with a higher prevalence in women: Anxiety and Depression Disorders [58][59][60]

Certain conditions affect women with higher prevalence due to various factors, such as anxiety and mood disorders. In related research, barriers to funding for such studies are encountered:

- Research Funding Disparities: Despite the higher prevalence of anxiety and depression in women, there may still be funding disparities in research explicitly dedicated to understanding and treating these conditions in women
- Factors Influencing Funding: Funding decisions for anxiety and depression research can be influenced by various factors, including public health priorities, available research evidence, advocacy efforts, and the specific focus of funding agencies or organisations.

Research on gender and mental health, often focused on comparing men and women, has resulted in a limited understanding of men's mental well-being. This has led to the assumption that women are more prone to internalizing disorders like depression and anxiety, while men exhibit externalizing symptoms such as violence and substance abuse. These patterns are attributed to gender differences in socialization, expectations associated with traditional gender roles, help-seeking behaviors, coping mechanisms, and socioeconomic status. However, current findings may be influenced by clinical and measurement biases, underestimating men's experiences and potentially leading to problematic assumptions about gender-related symptoms. This could result in an underestimation of the prevalence of depression and anxiety in men, as their mental health issues may be inaccurately measured and understood. [61–64]

Furthermore, it is essential to emphasise that the primary indicators of depression are based on the men model, which may differ significantly from that of women. Because of that, men are more likely to be diagnosed with depression, even though women are the ones with overtreatment with antidepressants. That overtreatment might also be an element of underdiagnosing other psychological issues in women.

e. Conditions that impact men and women differently: HIV and AIDS

Some illnesses can affect men and women disparately because of biological, hormonal, or socio-cultural factors. Examples include autoimmune conditions like lupus and mental health issues such as infectious diseases like HIV and AIDS. [59]

Specific biological and genetic disparities leading to different courses and outcomes in HIV infection have been observed. For instance, following seroconversion of HIV type 1, women exhibit HIV viral loads up to 40% lower and higher CD4 T-cell counts compared to men. On the other hand, in cases where viral loads are similar between men and women, women undergo a faster progression to AIDS than men. [65].

Furthermore, there are disparities in prevalence, as observed in Sub-Saharan Africa, where women constitute 60% of the total individuals living with HIV infection. [66] Worldwide, illnesses associated with AIDS are the primary cause of death for women between the ages of 15 and 49. [67]

Women have worse access to trustworthy sexual education than men, particularly when it comes to sexually transmitted infections, which increase the risk of HIV infection and subsequent development of AIDS. [68] Women are likely to experience social pressure to become mothers and to forego using condoms for protection out of fear of societal rejection. Moreover, they choose to become pregnant for the economic stability gained from the prospective father. [69] These explanations may have an impact on the statistics that in the 12 months of research, almost 89% of women had condomless vaginal sex. [70] Pregnant women refuse to test for HIV because of fear of societal rejection. [71] Women who have experienced gender-based violence are 50% more likely to contract HIV. [67] Even though all those arguments increase the risk of infection, women require a lengthier time to be diagnosed with HIV and AIDS and are treated using milder methods. [72] These data are even more atrocious for transgender women because they have a 49-fold higher risk of HIV infection than the general population. [73]

The funding for diseases that affect men and women differently can vary depending on disease prevalence, severity, and the research focus of organisations. Funding may be allocated to understand the gender-specific aspects of these diseases, explore differences in symptoms, progression, and treatment responses, and develop personalised approaches to care. [59]

- f. Lack of studies of specific collectives: non-binary people, trans people and intersex individuals**
Insufficient data exists to identify patterns in the involvement of trans and non-binary individuals in clinical trials. Nevertheless, Paschall highlighted that out of the 116,057 articles reporting clinical trial outcomes published between July 2018 and February 2022, only 78 studies (0.06%) acknowledged the inclusion of transgender participants. Most of these trials were concentrated on HIV or sexually transmitted infections, thereby reinforcing stigma and discrimination against these groups. [74]

The health needs of these communities are identified through studies conducted by civil organisations led by individuals from the respective communities themselves:

The majority of trials and existing literature on the subject indicate that their perception of health is compromised by the violence they experience from their environment, including within the healthcare system itself, such as through the pathologisation of their existence. [75]

Gender and funding

- a. Gender impact on funding opportunities**

Gender disparities in funding opportunities exist across various medical fields, including medical research. Research studies consistently indicate that women face difficulties obtaining research funding compared to their men counterparts. This imbalance is evident in the allocation of grants, sponsorship opportunities for clinical trials, and support for independent research projects. [76]

Researchers who are not cisgender men frequently encounter obstacles in accessing financial resources, which can significantly impact their ability to conduct research, publish studies, and make significant contributions to their respective fields. The underrepresentation in funded research projects not only restricts their professional growth but also reinforces gender-based inequities in scientific advancements. [77]

b. Policies and practices to ensure equity

- *Transparent Grant Allocation Procedures:* It is essential to ensure equity in funding opportunities by implementing unbiased grant allocation procedures. Funding agencies and medical institutions should establish comprehensive guidelines not influenced by gender biases. The evaluation of research proposals should be based solely on merit, and the applicant's gender should not be a factor. [78]
- *Diversity in Decision-Making Bodies:* Ensuring diversity in the committees responsible for awarding research grants is crucial. By including more women in these decision-making bodies, we can counteract potential biases and guarantee a more comprehensive evaluation of research proposals. Extending this diversity to encompass individuals from different backgrounds, ethnicities, and experiences is also essential.
- *Mandatory Gender-Equity Assessments:* It is suggested that institutions should make it compulsory to conduct gender- inequitable assessments during their funding processes. This would entail analysing the gender-specific impact of research proposals and guaranteeing that projects contribute towards bridging prevalent gender disparities in knowledge and healthcare. Moreover, it would motivate researchers to deliberate on gender-related aspects while actively conducting their studies.
- *Supportive Policies for Work-Life Integration:* Institutions must acknowledge difficulties balancing their research careers and personal responsibilities that still mostly affect women. As a result, organisations should establish policies that promote work-life integration. These policies should include arrangements for parental leave, flexible working hours, and childcare assistance, fostering an atmosphere where people of all genders can pursue research while fulfilling their family obligations.
- *Promotion of Gender-Responsive Research:* It is crucial to back and promote research that focuses on health issues related to gender. This helps in comprehending medical science more comprehensively by exploring gender-specific aspects of both, endo- and intersex people, healthcare inequities, the effect of gender on treatment results and transgender healthcare. [78,79]
- *Education and Training on Gender Equity:* Integrating education and training initiatives centred around gender inequity into the research community is crucial. Such programs can enhance knowledge about the current disparities, equip with tools to eliminate prejudices and encourage a culture of inclusiveness within research institutions.

Intersections for gender representation

A long line of Black feminist philosophers, starting with Sojourner Truth in 1851 and ending with Kimberlé Crenshaw in 1989, are credited with developing the idea of intersectionality. The concept of intersectionality

describes how various identities, such as race, gender, and sexual orientation, interact with systems of power and oppression (such as racism, sexism, and heterosexism) to influence people's lived experiences, health, and well-being. [80]

Therefore, when addressing gender representation in medicine and science, it is essential to consider these intersections:

- a. **LGBTQIA++ individuals:** There are apparent disparities in STEM and an overall underrepresentation of LGBTQIA++ representation in medicine and research. Several studies attribute these disparities to the lack of LGBTQIA++ individuals who work in those fields due to inequalities and discrimination. They state that this creates gaps in healthcare knowledge that must be addressed to provide better community care services. [81]

In the 2017–2021 Association of American Medical Colleges Graduation Questionnaire, which was given to fourth-year medical students enrolled in doctor of medicine programs in the USA and Canada, despite the growth in the US general population, ≤5% of respondents identified as gay, lesbian, or bisexual, and <1% as transgender. According to a 2008 survey of 502 American adults, 35.4% of patients would switch clinics if a homosexual or lesbian therapist was working there, while 30.4% of patients would switch physicians from a gay or lesbian clinician. Such discriminatory and invalidating experiences worsen mental health conditions, lead to fatigue, and generally degrade psychological safety in sexual and/or gender minority healthcare workers' (SGM HCWs) workplaces. [82]

Transgender healthcare students may face serious barriers during medical school. Non-inclusive structures, hearing derogatory comments about transgender individuals or witnessing discrimination might lead to self-censorship and non-disclosure of their identity in fear of discrimination or lack of support. It is therefore important to proactively foster an inclusive and non-discriminatory atmosphere within the faculty. This starts with the use of the preferred name and pronouns of the students wherever possible. Mandatory training of faculty staff might help mitigate implicit bias in assessment of competencies and the provision of mentorship. Providing gender-inclusive restrooms and locker rooms, offering LGBTQIA+ sensitive counselling and the use of gender-inclusive language in all forms and learning materials are steps in providing a more inclusive learning environment. [83,84]

A cross-sectional survey in the UK studies the medical education curriculum and found that only 26% of schools found that their education on LGBTQIA++ health matters needed to be more suitable and sufficient despite the efforts of universities to have a more inclusive curriculum. And advised the need to put more effort into improving medical education so it covers all public health matters while being inclusive of the specific needs of the LGBTQIA+ community. [85]

Transgender and gender-diverse people worldwide are facing health inequities. A study in the US found that in 2015, one in three transgender adults experienced at least one negative event related to healthcare such as verbal harassment, physical or sexual assault or being refused treatment. [86]. The fear of stigmatisation and discrimination itself may lead to a delayed utilisation of healthcare services, which itself is a significant risk factor for a worse health status in general. [87]. Therefore, medical schools have to combat these inequities by providing trans-inclusive healthcare education. This might include general theoretical knowledge on the topic to educate and counter prejudices, addressing it in practice-based communication trainings preferably involving transgender community members, the integration of transgender-specific healthcare education into the curricula and generally moving away from binary conceptualizations of sex and gender within textbooks and the whole curriculum. [88–90]

We need to emphasise the importance to base education on transgender issues on proper scientific evidence and to rely on guidelines and recommendations by professional associations like WPATH. Scientific disinformation on its own has become a significant health risk for transgender individuals by restricting accessibility of gender-affirming healthcare and fostering harmful legislation. [91,92]

- b. People with disabilities:** Disability affects an estimated 1 billion people globally. The recognition of people with disabilities' human rights, their equitable access to education as health workers, the improvement of health services that arise from learning in an inclusive environment, and the financial case that people with disabilities are valuable assets in the health workforce are just a few of the reasons that support concerted efforts to increase hiring and retaining of disabled health workers. A mere 50% of medical schools in the United States state that they offer a program on disability awareness as part of their curriculum. It is crucial to consider the source of physicians' education and how it's provided regarding PWD. [93,94]

Other studies have also called out the underrepresentation of people with disabilities in clinical trials and how it brings about inequalities in health. I advised adopting a patient-centred approach when reaching decisions about patients' health, especially those with disabilities. [95]

A systematic review published by the NIH also highlighted the need to include people with disabilities in research studies as they experience a higher rate of chronic illness. This specific study showed how research often does not work to have and adhere to disabilities, thus excluding them from healthcare advancements. [96]

- c. People living in rural and remote areas:** The two main factors defining remote health are geographical location and the kind of healthcare practice necessary for that location's particular context. In Australia, remote health has been distinguished from rural health and is characterised by isolation, limited access to services, and a comparatively high percentage of Indigenous residents. Alternative treatment models are required to tackle these issues. Despite the inevitable overlap, these concepts emphasise the distinctions between learning in urban and distant health contexts for health professionals. Since each area varies greatly and has different demands and resources, providing health professional education for remote practice can be challenging. [97]

- d. People of colour:** Patriarchal and colonial histories and ideals influence how medical education affects physicians and patients in Western contexts. By underrepresenting racial and ethnic minorities—for example, by using different presentations and clinical signs for patients with darker skin tones—educational textbooks reinforce norms based on Whiteness. The first study on racial diversity in textbooks was released in 2018 by the University of Washington. The findings brought to light the significant underrepresentation of Black, Asian, and minority ethnic (BAME) populations in the medical school curriculum. Less than 1% of the illustrations in the Atlas of Human Anatomy, a widely recognised educational resource utilised by medical schools worldwide, depict people with dark complexion. Patients of colour have received incorrect diagnoses as a result of the lack of diversity in dermatology literature and medical education. Because they are frequently trained to treat white patients, medical personnel may find it challenging to identify illness symptoms in patients with different skin tones. [98]

Future generations

- a. Diverse role models and mentors**

Medical literature consistently addresses the positive aspects of role modelling. Role modelling is essential to clinical training if defined as demonstrating skills, providing feedback, and emulating specific professional

behaviours. [99,100] Numerous studies demonstrate that women's role models in various fields increase women's participation and contribute to prolonged engagement in those fields. [101]

The exposure of medical students, especially non-cisgender men, to role models and examples in their fields can boost their performance. The Springer research journal has studied this as they showed the presence of women in senior positions in the medical field has a positive effect on women medical students' motivation and aspiration. This study specifically focused on women pre-med students and their sense of belonging in their field of study. Thus, gender representation is essential in this aspect as it allows for the sustainability of our goal of decreasing the gender gaps. [102]

Another recent study proposed strategies to increase women's presence in STEM, specifically Biomedical engineering and medical physics. Those strategies focus on women's empowerment by creating leadership programs and helping them reach higher positions by creating a work-life balance. [103] The American Journal of Surgery found that early in women's careers, they benefit more from having fellow women mentors and role models in their surgical careers. This is important, especially as surgical specialities are often men-led. [104]

b. Innovation

Regarding innovations and patent discoveries in medicine and science, we tend to see fewer women having patents and fewer investments in their research. The importance of tackling this issue falls on the fact that their research focuses on women's health and reproductive health discoveries. A study published in a science magazine has dated this cause to the lack of women-focused discoveries in medicine and science. [105]

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