

# Women

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I N S C I E N C E

*where are we now and  
how to move forward*



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**Women in Science:**  
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## **Women in Science: where are we now and how to move forward**

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Sincerely,

*Luisa, Letícia, Isabela, Fernanda, Saul e Júnia*



# Women in Science

***Have fun reading with this mini guide!***



Highlights interesting facts



Alerts to important information



Highlights news



"Food for thought" section



Presents movie recommendations



# Foreword

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Our guide entitled "Women in Science: where are we now and how to move forward" focuses on gender equality in science, or better yet, the lack thereof. Nowadays, being a scientist in Brazil is nothing short of a challenge: besides the lack of funding destined for scientific research, daily threats from science deniers abound. However, our brief historical review led us to believe that women in STEM, especially those with intersecting identities, may face even greater obstacles, and the gender gap is, unfortunately, very much alive.

According to the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), the representation of women in science varies according to the area of knowledge. While in male-dominated fields such as computer science and mathematics, they represent less than 25%; among the Health Sciences, there is a female majority - more than 60%. However, recent evidence shows the prevalence of women in leadership positions is less than ideal.

Why does it happen? Is this the scenario of Dentistry? How can we bridge the gender gap in science? We aimed to present current data, to promote self-reflection, and to inspire the reader to act towards meaningful change. We believe the concepts and data presented here are important for everyone, whether you are a dentist, a scientist, a woman or not. In Epidemiology, we would say that a representative sample of society is essential - here, this expression could be replaced by the term diversity, for it guarantees that the fight of one is the fight of all.

***We hope you enjoy our call to action!***



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## 01 INTRODUCTION

At this moment, if we asked you to name some of the most influential women in history, would you be able to name a few? We consider historical contextualization as a necessary first step in the study of gender inequality in science.

Pioneer women scientists not only represent a figure of inspiration for future generations, but their contributions and life stories are also relevant learning resources. Through them, it is possible to analyze and to better understand the changes in the social role of women through time (KHALIL *et al.*, 2017). Here we list the names of inspiring women who were essential in the fight for the female presence not only in the scientific field but also in other contexts that support it, such as politics.

According to the United Nations, Egypt ranks 129th out of 156 countries in terms of the Gender Inequality Index (WEFORUM, 2021). Unlike the current reality, in Ancient Egypt, women had a high degree of equality of opportunity and freedom in relation to men of the same social position. That is, social dignity was not based on gender, and women could occupy important positions, holding legal and economic rights given to men of the respective social class (KHALIL *et al.*, 2017).

Cleopatra VII, the famous Egyptian queen, was presented to the Western imagination as a symbol of power, beauty, and seduction. Here are some less-known facts about Cleopatra: she studied in one of the greatest intellectual centers of antiquity, having studied mathematics, astronomy, philosophy, and oratory; she was fluent in several languages; records indicate that Cleopatra supported researchers in exploring the Colossal Library of Alexandria, including well-known researchers and mathematicians (KHALIL *et al.*, 2017; MARASCIULO, 2018).



**ANCIENT SOURCES INDICATE THAT WOMEN IN ANCIENT EGYPT WERE NOT SUBSERVIENT TO MEN, THEY COULD CHOOSE WHO THEY WOULD MARRY AND THEY COULD CHOOSE TO GET A DIVORCE.**



**CLEÓPATRA VII**

Moreira-Santos *et al.*, 2022.



## Women in Science

In Dentistry, Lucy Hobbs Taylor (1833-1910) stands out as the first woman with a degree in dentistry in the United States. Lucy was first refused admission in Medicine and Dentistry because she was a woman. Notwithstanding, in November 1865, she was admitted to the senior class of the Ohio College of Dental Surgery, having graduated in February 1866 (LUCY, 2021).

The suffragettes were women who campaigned for female participation in politics and the right to vote. This was an arduous struggle in Brazil and in the world, with different records of events. In New Zealand, women succeeded in their quest for voting rights in 1893, in Brazil in 1932, in Switzerland in 1971, and, recently, in 2015, in Saudi Arabia (BRASIL, 2020). In this context, in Brazil, Bertha Lutz (1894-1976), a zoologist by profession, stands out as the greatest leader in the fight for the political rights of Brazilian women. She fought for the approval of the legislation which granted women the right to vote and to be voted on (BRASIL, 2015; BRASIL, 2020).



**BERTHA LUTZ**

Moreira-Santos *et al.*, 2022.

Have you ever heard of Marie Curie (1867-1934)? She was the first person and still is the only woman to win the Nobel twice in two separate fields. She shared with her husband, Pierre, and with Henri Becquerel, the Nobel Prize in Physics for the discovery of radioactivity, and later, in 1911, was awarded the Nobel Prize in Chemistry for her studies of the elements radium and polonium (MARIE..., 2022).



**MARIE CURIE**

Moreira-Santos *et al.*, 2022.

## Women in Science

In Medicine, Nise da Silveira (1905-1999) was a Brazilian psychiatrist. She graduated in 1931 from the Faculty of Medicine of Bahia, the only woman among the 157 men in the class. The Occupational Therapy Section was established by Nise in 1946, at the National Psychiatric Center, in Rio de Janeiro. Nise was vehemently opposed to the psychiatric treatments used at the time (electroshock, lobotomy, and insulin coma). The revolutionary work of Nise used art as a form of expression, giving schizophrenic patients the freedom to express their internal conflicts. In 1952, the collection of the art produced by her patients was stored in a museum, known as the "Museu de Imagens do Inconsciente". Nowadays, it holds a collection of more than 350,000 works, and the history and timeless contribution of Nise live to this day (HISTÓRICO..., 2021).



**THE "MUSEU DE IMAGENS DO INCONSCIENTE" IS LOCATED IN RIO DE JANEIRO. IT IS RECOGNIZED AS A "MEMORY OF THE WORLD" BY THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION, UNESCO.**



**MOVIE RECOMMENDATIONS: RADIOACTIVE;  
NISE: THE HEART OF MADNESS**



**NISE DA SILVEIRA**

Moreira-Santos *et al.*, 2022.



Back to politics, Alva Myrdal (1902-1986) was the woman who helped transform Sweden into the model of development we know today. In the book "Crisis in the Population Question", published in 1934, Alva and her husband, Gunnar, advocated for universal welfare benefits and better, more affordable housing. **Women should be free to work or study, which in turn implied the need to create safe spaces where their children could stay during the day (ALVA..., 2021).** Most of their proposals have been developed, and this consists of the so-called Swedish welfare state. In 1949, Alva was the first woman to be invited to a high-ranking position at the United Nations. In 1982, when Alva was 80 years old, her work in favor of disarmament and nuclear-weapon-free zones was recognized, and she was awarded the Nobel Peace Prize (ALVA..., 2021).





**ALVA MYRDAL**

Moreira-Santos *et al.*, 2022.

At the *Sociedade Brasileira de Pesquisa Odontológica* (SBPqO), which is the Brazilian division of the International Association for Dental Research, we have had five female presidents: Esther Goldenberg Birman, Maria Fidela de Lima Navarro, Katia Regina Hostilio Cervantes Dias, Altair Antoninha Del Bel Cury and Isabela Almeida Pordeus.

In the current context of the COVID-19 pandemic, the Brazilian researcher Jaqueline Goes, biomedical and Ph.D. in Human and Experimental Pathology from the Universidade Federal da Bahia, stands out. She distinguished herself for being part of the team responsible for sequencing the genome of the SARS-CoV-2 virus, carried out in just 48 hours after the confirmation of the first case in Latin America (AS BRASILEIRAS..., 2020). In addition, she has also contributed to the sequencing of the Zika virus genome (AS BRASILEIRAS..., 2020).



**ISABELA PORDEUS**

Moreira-Santos *et al.*, 2022.



**JAQUELINE GOES**

Moreira-Santos *et al.*, 2022.

## 02 WHAT IS GENDER INEQUALITY:

### Important concepts

Do you know the difference between the terms gender and sex? Are these terms synonymous? Remember that it is not correct to use them as synonyms, which unfortunately can happen quite frequently. It is essential to point out that gender concerns the social aspects attributed to sex, which represents the biological characteristics that differentiate men and women (GUEDES, 1995).

## Women in Science

Gender is a non-binary, socially constituted construct not associated with natural characteristics (SHAMSEER *et al.*, 2021). Despite this, scientific literature often addresses the gender variable as binary, that is, female or male. Because of this, in this guide, when reporting studies on the subject, at times, we will refer to gender as binary. However, we must highlight that it refers to cultural definitions that society understands and imposes as the social role (MONEY; HAMPSON; HAMPSON, 1955).

In this sense, gender role refers to the set of norms that dictate what behavior is considered desirable or appropriate for an individual according to their biological or perceived sex (MONEY; HAMPSON; HAMPSON, 1955). In phrases such as “taking care of the house is a woman's job”, “like a girl” and “man up”, the difference between the terms mentioned above can be better understood. Here, it is evident that being a woman is not just about having specific biological and anatomical characteristics. It is understood that there is one more meaning attributed to being a woman, in addition to biological sex, that is, gender.

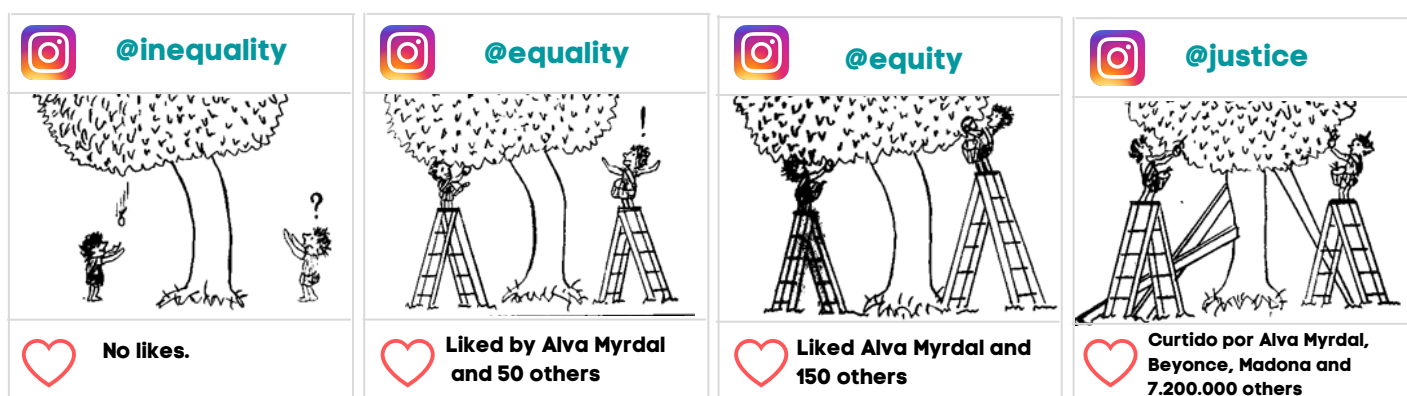


**IN 2021, A SECTION ON MATERNITY LEAVE WAS ADDED TO THE LATTES PLATFORM, THE MAIN CURRICULUM PLATFORM USED BY BRAZILIAN RESEARCHERS. THIS REPRESENTS A GREAT IMPROVEMENT AND MEANINGFUL CHANGE IN THE FIGHT AGAINST SEXISM FOR BRAZILIAN WOMEN IN ACADEMIC SCIENCE**



**GENDER IDENTITY IS THEREFORE THE GENDER WITH WHICH A PERSON IDENTIFIES AND WOULD LIKE TO BE RECOGNIZED REGARDLESS OF BIOLOGICAL SEX.**

The concepts of inequality, equality, equity, and justice will be explained through the following illustration, which is a reinterpretation of four comics made by the American illustrator Tony Ruth (HANCOCK, 2020). Our reinterpretation started with the following idea: what if the illustrations were a photo from the social network Instagram and its relevance converted into the number of likes?



Rereading of Tony Ruth's illustrations, based on the children's book "The Generous Tree", by Shel Silverstain; by Moreira-Santos *et al.*, 2022.

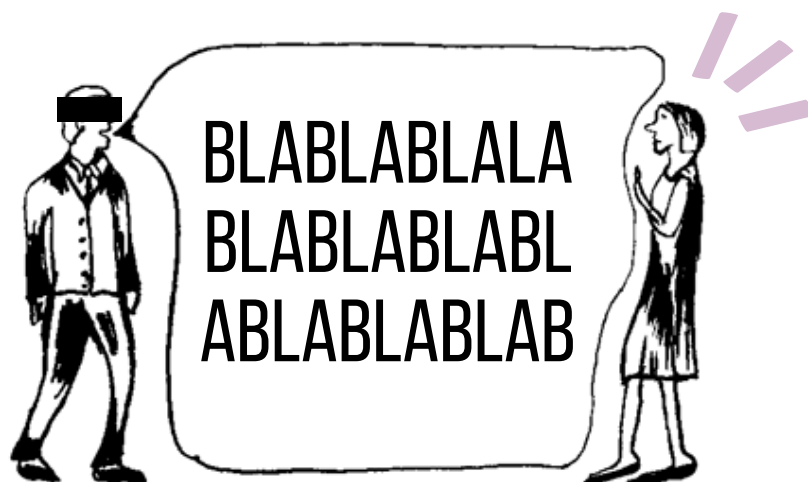


## Women in Science

- **Inequality:** Note that only one of the children has the opportunity to reach an apple. Access to opportunity is uneven.
- **Equality:** note that both children have ladders of equal height. However, because the tree is leaning in favor of one of them, only that one can reach the apples. Tools are distributed equally, but access to opportunity is uneven.
- **Equity:** Note that the child on the right has a higher ladder to reach the apple. That is, the tools help to reduce social inequalities since equity takes into account the needs and conditions of each person.
- **Justice:** note that no different ladders are needed because the tree has been straightened. In this context, the system is corrected to offer the same access to tools and opportunities.

Finally, these neologisms exemplify moments in which gender inequality occurs (PSDB, 2020).

- **Maninterrupting:** refers to the act of a man who constantly interrupts a woman, not allowing her to finish her sentence.
- **Mansplaining:** is when a man explains something considered obvious to a woman as if she does not or is not able to understand.
- **Bropropriating:** refers to a man that appropriates the same idea already expressed by a woman, taking credit for it.



Rereading of Kaye Blegvad's illustration for the New York Times, illustrating the term mansplaining. Here, we have added an eye mask to cover the character's eyes as a reflection. Do people with attitudes like this show empathy towards others and the world? How will the interlocutor feel? By Moreira-Santos *et al.*, 2022.

## 03 GENDER INEQUALITY: Why does it happen?

Gender inequality in science is rife and unacceptable - it has been widely reported that women are underrepresented in Academia across disciplines, but particularly in areas known as STEM - science, technology, engineering, and mathematics (DANBOLD; HUO, 2017; NCSES, 2017; NCSES, 2017). 2021). At this point, you might be wondering: why and how does it come to be? Evidence points to a few factors, including systemic bias, lower professional performance, and also socially constructed implicit bias (WITTEMAN *et al.*, 2019; CALAZA *et al.*, 2021; FRANCO *et al.*, 2021).

According to the Cambridge University Press Dictionary© (CAMBRIDGE, 2022), the word “bias” refers to “the action of supporting or opposing a particular person or thing in an unfair way, because of allowing personal opinions to influence your judgment”. In science, this lack of impartiality may lead to detrimental consequences for the progression of researchers in their careers, reinforcing pervasive inequalities (WITTEMAN *et al.*, 2019; CALAZA *et al.*, 2021). For instance, systemic bias refers to the way selection processes are organized and how they may favor male researchers (WITTEMAN *et al.*, 2019). Thus, in comparison to their male colleagues, women are less likely to be recognized as potential scientific leaders (CARLI *et al.*, 2016) and selected to receive awards (LINCOLN *et al.*, 2012).

An example can be seen in the distribution of the Nobel Prize by gender over the years from 1901 to 2021: it was awarded to women only 59 times, only 9.7% of the total (NOBEL..., 2022a; NOBEL..., 2022b). In 2021, of the 13 individuals awarded the prize, the only woman was journalist Maria Ressa, who received the Nobel Peace Prize together with Dmitri A. Muratov – the equivalent of 7.6% (NOBEL..., 2022c). The reality behind the number is often marked by deep inequities, in addition to the lack of recognition of the work of brilliant scientists who were unfairly not recognized nor awarded. The systematic non-recognition of women's work is identified with the expression “Matilda Effect” (ROSSITER, 1993). The term is a tribute paid by Margareth W. Rossiter to Matilda J. Cage, a New York-born feminist and suffragette who lived in the United States in the 19th century (ROSSITER, 1993). In this context, the lower productivity of female researchers is also a relevant point (WITTEMAN *et al.*, 2019). Some factors that may influence productivity are worth mentioning, including the socially prescribed gender role for women and their stereotype as caregivers, in addition to possible conflicts between family and work (WOOD; EAGLY, 2012; GRUBER *et al.*, 2021).

Due to unfair and prevailing implicit rules relating to gender roles, the negative impact on the productivity of male and female scientists is not the same (GRUBER *et al.*, 2021). There may be an imbalance in the division of time devoted to childcare and that time devoted to research (GRUBER *et al.*, 2021), impacting the productivity and stability prospects of women who are also mothers.



Another factor that can lead to gender inequality in science is individual bias (WITTEMAN *et al.*, 2019), which refers to the subjective assessment of the individual in decision-making processes, such as a manuscript peer review or selection processes. Such bias can manifest itself consciously or not, the latter is also known as implicit bias (PRITLOVE *et al.*, 2019; WITTEMAN *et al.*, 2019). Socially constructed implicit bias may derive from stereotypes or perceptions of a person's experience (CALAZA *et al.*, 2021). According to Calaza *et al.* (2021), addressing this practice of unfair judgement is paramount to breaking science free of systems of oppression.

Previous studies have addressed the implicit bias issue in health services, through personnel training (SHERMAN *et al.*, 2019; ZEIDAN *et al.*, 2019). However, it is worth mentioning that approaching inequalities as derived only from an individual practice associated with implicit bias may be an inadequate approach with limited efficacy (PRITLOVE *et al.*, 2019). According to Pritlove *et al.* (2019), the problem itself is broader, more complex, and requires attention to its structural factors, institutions, and public policies. In the progress towards a more equitable and fair society, the development of complex actions associated with the deconstruction of gender stereotypes inside and outside science is imperative.

## 04 THE GENDER GAP IN DENTAL SCIENCE: Where are we now?

In Dentistry, the scenario is no different: gender inequities abound in research and also in Academia (TIWARI *et al.*, 2019). In recent years, the numerical increase in gender diversity among researchers has been a trend (TIWARI *et al.*, 2019). Despite this, women still face numerous difficulties daily that limit their real inclusion at all stages of their career (KANG; KAPLAN, 2019), a reality often intensified for those with other social identities, such as ethnicity (TRICCO *et al.*, 2021). The metaphor of the "leaky pipeline", has been used to indicate the decline in the number of women present at each stage of their professional career progression (PELL, 1996). A recent study exemplifies for us what this concept would be in the real world setting (ISTRATE *et al.*, 2021). Although there is currently a similar proportion between men and women graduating in Dentistry in the United States (ISTRATE *et al.*, 2021), in the evaluation of the gender distribution in the highest leadership position within the Faculties of Dentistry in the country, that of dean, it was found that for every woman, five men are acting in the same role (BOMPOLAKI; POKALA; KOKA, 2021).

## Women in Science

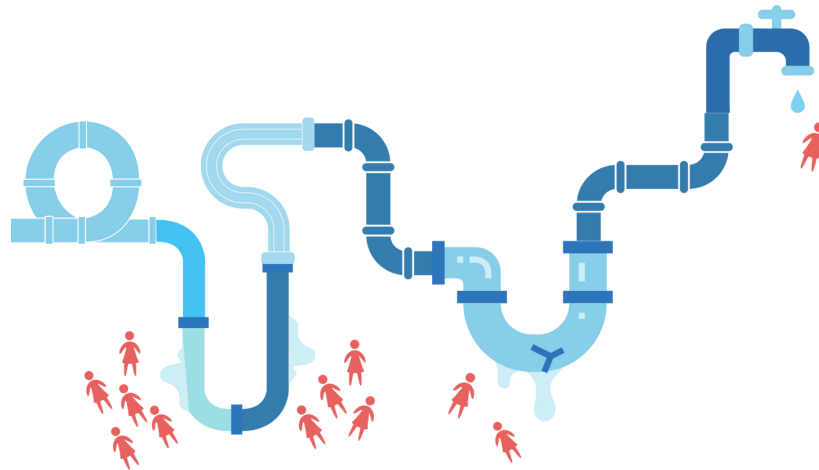


Illustration of the "leaky pipeline" metaphor, by Moreira-Santos *et al.*, 2022.



In Brazil, access to Higher Education is still restricted to a few individuals. According to the Instituto Brasileiro de Geografia e Estatística, for the adult population over 25 years old, only 17.4% reported having completed higher education (IBGE, 2022a). Also, according to the IBGE, women work an average of three hours more than men per week, however, their income is only 76.5% of theirs (IBGE, 2022b). This social scenario, together with the worrying devaluation of science and scientific research in the country (HALLAL, 2021), may restrict women's option for a scientific career, who tend to opt for careers that are better paid and offer financial stability (LEITE; DIELE-VIEGAS, 2020). **In an attempt to address gender inequities in society as a whole, it is also necessary to look at social inequalities and inequities in access to education.**

Concerning Dentistry, in the year 1900 there were three Dental Faculties in the country (MORITA *et al.*, 2020) and, according to Lucia *et al.* (2008 cited by TIWARI *et al.*, 2019), in 1920, women represented 16% of dentists. According to the Conselho Federal de Odontologia – CFO (2018 cited by TIWARI *et al.*, 2019), recent data indicate women as the majority of registered dentists and, in the academic environment, women correspond to 55% of researchers. (GENDER..., 2021).

A focus of previous studies has been the evaluation of gender disparities in the productivity of scientists (LARIVIÈRE *et al.*, 2013; ODIC; WOJCIK, 2020; SARTORI *et al.*, 2021), since evaluation processes mostly emphasize traditional criteria - such as number of publications and citations, order of authorship and journal impact factor (RICE *et al.*, 2020). A recent study evaluated female participation in publications of high-impact dentistry journals (SARTORI *et al.*, 2021). The prevalence of women in the position of first and last author was, respectively, 37.2% and 22.6%. An interesting finding of this study regards women in leadership positions, such as last author – the authors found a significant increase in the participation of women as first author (SARTORI *et al.*, 2021).



The gender gap within dentistry is also present in the representation of guest speakers at scientific events, as pointed out by a study that evaluated events in the area of Dentistry in the United Kingdom (HEGGIE; MCKERNON; GARTSHORE, 2021). Among the invited speakers, 39.8% were identified as female and 60.2% male – only 21.4% of the conferences that took place in the observed period had a balanced distribution of gender for the guest speakers (HEGGIE; MCKERNON; GARTSHORE, 2021).



**IN SCIENTIFIC PAPERS IN THE FIELD OF DENTISTRY, THE POSITIONS OF FIRST AND LAST AUTHOR ARE CONSIDERED HIGHLY PRESTIGIOUS. THEY REPRESENT, RESPECTIVELY, THE LEAD AND THE SENIOR AUTHORS OF THE STUDY.**

Still in this academic context, a randomized clinical trial evaluated the impact of the candidate's gender and career stage in a simulation of a postdoctoral selection process (FRANCO *et al.*, 2021). Is there a merit-based evaluation system? To answer this question, identical CVs were created for the researchers, changing only the gender and career stage (FRANCO *et al.*, 2021). “Arthur” was more likely to score better than “Claire” in all the categories evaluated, regardless of his career stage – not because of his competence assessment, but simply because he was a man. Gender alone led to the devaluation of the candidate, suggesting a fragile meritocracy (FRANCO *et al.*, 2021).

If this study caused you any unease or discomfort, know that you are not alone - it has had important repercussions on social media. According to Elsevier's PlumX Metrics platform, until January 8, 2022, the study had 6260 interactions on various platforms, with a special emphasis on Twitter (PLUMX, 2022). The use of social networks as a means of communication by scientists facilitates interaction and dissemination of information with other actors in society, such as journalists, politicians and members of civil society (WALTER; LÖRCHER; BRÜGGEMANN, 2019). Examples of current affairs that were widely publicized on Twitter were debates related to the #metoo and #blacklivesmatter movement. Both movements present a proposal to fight against injustices and systems of oppression: the movement against sexual harassment in the workplace and the fight against white supremacy and violence against blacks (ARRUDA, 2020).

The #metoo movement is placed in a context in which growing awareness of the topic has been noted. Initially used by Tarana Burke in 2006, it was not until 2017 that the expression gained worldwide recognition with the avalanche of complaints made in the case of Harvey Weinstein (GILL; RAHMAN-JONES, 2020), a former film producer convicted of rape and sexual assault against women (PRESSE, 2020). This reality, unfortunately, is not restricted to Hollywood: a survey carried out in the United States showed that more than half of the women interviewed (54%) reported previous experience of unwanted and inappropriate sexual advances from men at some point in their lives, 30 of which % of them in the work environment (LANGER, 2017).

In the scientific community, there is evidence about the experience of sexual harassment and discrimination in Medicine (JAGSI *et al.*, 2016) and Dentistry (IVANOFF *et al.*, 2018). Despite this, a multicenter survey carried out with dental students in four countries (Brazil, United States, Bulgaria, and India) observed that almost half reported that their institution was not or was not very vigilant about these issues, while 54% said they felt comfortable reporting such an event (IVANOFF *et al.*, 2018). These data show there is ample space to foster the construction of a safer university environment that enables the full development of academic activities by all.



ACCORDING TO A SURVEY  
CARRIED OUT BY NATURE, 13% OF  
SCIENTISTS REGULARLY USE  
TWITTER.  
(VAN NOORDEN, 2014).

## 05 INTERSECTIONALITY

Intersectionality is recognized as an important approach in several disciplines and, more recently, in Medicine and Dentistry (CRENSHAW, 1989; SPRINGER; HANKIVSKY; BATES, 2012; MUIRHEAD *et al.*, 2020). The term was initially coined by Professor Kimberlé Crenshaw, who saw dire need for a change in our paradigm as a society to appropriately address the unique challenges faced by African American women, as a matter of social justice against bias and violence. Nowadays, it is widely used to consider at the same time the cumulative impact of different aspects of an individual's identity (CRENSHAW, 1989) and social differences (SPRINGER; HANKIVSKY; BATES, 2012). In this way, ethnicity, race, gender, socioeconomic status, sexual orientation, age, racism, and sexism, for example, are considered together (SPRINGER; HANKIVSKY; BATES, 2012). Through intersectionality lenses, an expanded and holistic view of differences is sought. When one considers the oppression of women only concerning gender, with no regard to all other circumstances that may also be present (CRENSHAW, 1989) – this consists in a limited view.

At this point, you might be wondering if the gender gap in science has been addressed according to an intersectional framework. Recent studies have sought to shed a light on the intersection of gender and ethnicity in an attempt to address the longstanding challenges faced by minoritized women in their academic careers (KHAN *et al.*, 2019; KOZLOWSKI *et al.*, 2022). But is there an unequal representation of groups in science, beyond gender? Let us take a look at data obtained from a bibliometric analysis across disciplines of first authors affiliated in the United States (KOZLOWSKI *et al.*, 2022). Women who were from Black and Latinx ethnicity were found to be underrepresented, in comparison to the country demographics (KOZLOWSKI *et al.*, 2022). In addition, one study aimed to investigate challenges faced by minority researchers in career progression (KAMENY *et al.*, 2014).

## Women in Science

Women who were from Black and Latinx ethnicity were found to be underrepresented, in comparison to the country demographics (KOZLOWSKI *et al.*, 2022). In addition, one study aimed to investigate challenges faced by minority researchers in career progression (KAMENY *et al.*, 2014). Women and/or people of color - African American, Hispanic, Native American/Alaska Native and Asian American (HILL *et al.*, 2016), answered to an open-ended questionnaire: 26% declared to have faced barriers relating to gender; while 72% listed race as a cultural barrier (KAMENY *et al.*, 2014). In other words, barriers to academic career advancement seem to be broader and intersectional (KAMENY *et al.*, 2014). In fact, in a mixed-methods study of the top 15 global Universities of Social Sciences and Public Health, the presence of ethnic minority women faculty decreased at each step in their career progression: from 19% of the total, at the junior level, to 15% at mid-level and less than 9% of senior positions (KHAN *et al.*, 2019). This contrasts with data for non-minority men, for whom participation increased from 25% at the junior level to reach over 45% at the senior level (KHAN *et al.*, 2019). These numbers highlight the urgent need for action. In this study, authors also analyzed the Universities' policies to foster diversity in science; however, the majority of them were found lacking in specific outcome-oriented goals, such as equal pay, effective recruitment, and retention strategies (KHAN *et al.*, 2019). Future studies should further analyze gender inequality in science and its possible intersections at a macrolevel view.



Illustration by the authors.



## 06 CURRENT REALITY

### COVID-19 pandemic

In March 2020, the World Health Organization declared COVID-19 a pandemic (WHO, 2020). Social distancing measures were necessary to prevent the spread of the virus and the contamination of the population. They led to the closure of research institutions, universities, and schools, which turned to remote teaching (STANISCUASKI *et al.*, 2021), resulting in unequal consequences for different groups (SHAMSEER *et al.*, 2021).

In this context, the pre-existing inequities in society were aggravated (STANISCUASKI *et al.*, 2021). A cross-sectional study analyzed the influence of gender, parenting, and race on the academic productivity of Brazilian scientists from different areas of knowledge (STANISCUASKI *et al.*, 2021). The group that showed the least impact were male scientists, while black women and women with children were the groups that most reported feeling the effects of the pandemic (STANISCUASKI *et al.*, 2021). These data provide us with important information and make us reflect on intersectionality: women with intersecting identities (race, motherhood) were the most affected groups. In our society, the fight against unfair stereotypes is a common demand among different groups. Thus, efforts towards better living and working conditions for women cannot be separated from the struggle of other minorities.

## 07 HOW TO MOVE FORWARD?

### Possible solutions



**Awareness at an individual level** is a good starting point. From there, we can reflect on the socially assigned gender roles and the expectations that society imposes on individuals. At this point, it is also worth thinking about the individual bias – as human beings, we are all susceptible to it, but it should not be used to justify discriminatory behavior.

At a higher level, we would like to emphasize the urgent need for structural and behavioral changes. Here, it is possible to encourage the construction of workspaces that seek to respect and include the diversities and representation of minority groups in leadership positions. In addition to achieving equity and representation in numbers, these groups need to be and feel included. In this sense, mentoring sessions with experienced professionals can be an interesting option. Other actions that can favor gender equality in science include the study of the subject in different contexts, flexibility regarding careers, and, in journals, representation among authors, reviewers, and editors.

## 08 CONCLUSION

In this guide, we aimed to gather relevant information about women in science, inside and outside of Dentistry, from the discussion of historical, social aspects and current data, referring to the challenges and achievements of women. We also sought to provide the reader with thoughts and questions on gender inequality in the scientific environment – why does it happen? How does it manifest? How is the dental context?

The study of gender representation in different areas of knowledge is needed to assess its occurrence and progress (SHANNON *et al.*, 2019), as well as to plan interventions (SHAMSEER *et al.*, 2021). However, we must also pay attention to broader and structural factors that play a role in changing this reality (PRITLOVE *et al.*, 2019).

Public awareness is key for change. It is essential to understand gender as a socially constructed and non-binary identity, in addition to a better understanding of the limitations imposed by gender stereotypes and their deconstruction. Evidence shows that when women occupy leadership positions, more opportunities open up for other women, whether in the university environment (BOMPOLAKI; POKALA; KOKA, 2021) or scientific publications (SARTORI *et al.*, 2021). Thus, a crucial point in the fight against inequities is the concern with providing conditions and incentives for researchers to opt for the academic environment and to be able to remain in it.

Finally, the work of women scientists is revolutionary – they must be recognized solely and exclusively for the science they produce. By fighting against the unfair standards imposed by society, doors are opened to a new future for the next generation, not only of young women scientists but also for those traditionally excluded and underrepresented in society and in the scientific environment – people of color, the LGBTQIA+ community, immigrants, indigenous people, among others. Diversity in all its spheres (TIWARI *et al.*, 2019) has been identified as essential in the development of innovative and excellent actions (SWARTZ *et al.*, 2019). In science, this could not be different: diversity and inclusion among researchers guarantee greater representation and visibility of the issues faced in society (SCIENCE..., 2018).

## RECOMMENDATIONS TO DENTISTS

### ***To the dentist***

Some practical day-to-day recommendations may be of interest for dentists who wish to work towards a society with equal opportunities for all:

## *Women in Science*

- Read about the subject, inform yourself and bring questions for dialogues with those you live with. It can be an important point to act towards community awareness.
- Reflect on your worldview and individual biases: be careful not to adopt discriminatory attitudes.
- Seek to partner with women. Understand the barriers they face and avoid reinforcing them. Pay attention to your actions and speeches so there is no discrimination or oppression. This is for everyone!
- Understanding gender as a socially constructed and non-binary construct is a key point.
- Be very careful not to reinforce existing gender stereotypes in society with your patients!
- Special attention when offering gifts. Have you ever noticed the marketing of industrialized products on the shelves of markets, and pharmacies, among others? There are shelves of personal hygiene products, for example, aimed specifically at men or women. This is done through the colors of the product packaging, and aroma, among others.
- And for children – have you ever stopped to think why girls' toys are usually dolls, miniature kitchens, while boys' toys are cars, robots, among others? Toys tend to replicate society's customs and can reinforce the maintenance of social roles that should be revised.
- Products like these perpetuate gender stereotypes, reinforcing the social roles, and therefore should be avoided.

### ***And for those who are women, dentists, and scientists***

- It is also worth reading about the subject, informing yourself, and talking about this subject with different people.
- Special attention to the concept of gender, stereotypes, and actions to combat them.
- Know the barriers that exist and seek to act to deconstruct them, so that future generations may have better living and working conditions.
- On a day-to-day basis, pay attention to your individual biases and seek to avoid discriminatory behavior in different contexts.

***Difficulties do exist, but do not give up! Your work has the potential to change our society and the world as we know it!***



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This guide aims to present data on gender equity in science and incite reflections, inspiring the reader to act towards meaningful change. In this work, we carried out bibliographic searches in scientific databases (PUBMED, SCIELO), as well as on websites of world-class organizations (UNICEF, UN), magazines, and newspapers (EL PAÍS, BBC). Initially, we presented a brief historical contextualization of the contributions of influential women throughout history in the scientific, political, and social spheres. In addition, key concepts were presented - such as the difference between gender and sex, clarifying possible misunderstandings. Subsequently, we addressed the gender gap in Dentistry and other disciplines by presenting the results of scientific studies, allowing the reader a bird's-eye view of the situation in Brazil and the world. We addressed the current challenges science faces during the COVID-19 pandemic. At last, we gathered some useful considerations and tips for dentists and for those with intersecting identities who are women, dentists, and scientists. Throughout the text, icons were arranged to direct the experience of the reader, presenting information, and data concerning gender equity in science and current events.

**Keywords:** Science. Dentistry. Gender Inequality.



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