Guide for incorporating a gender perspective in research and development of Artificial Intelligence (AI) in Health.

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Work team

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Objectives

This user guide aims to provide both conceptual and practical tools to promote the development of Artificial Intelligence (AI) research with a gender perspective in the healthcare sector.

To achieve this, it offers a brief review of key concepts, presents relevant examples, and suggests questions for research teams to analyze their projects and integrate a gender perspective effectively.

Disclaimer: AI tools were used to contribute to the development of this document.

What do *gender, gender perspective,* and *intersectionality* mean?

We often hear the term "gender," but do we truly understand its meaning? How is it different from "sex"? Why is it important?

To begin, **the concept of gender refers to a sociopolitical process, which is historic and dynamic, through which society defines what is considered masculine or feminine.** These definitions, which can be thought of as social mandates, usually assign different physical, mental, and emotional characteristics, as well as specific roles, behaviors and opportunities to men and women[1,2].

In most societies, these mandates about what is masculine and feminine, although they vary and evolve over time, tend to structure political, social, economic and cultural life, as well as how care and reproduction of life are organized. This tends to create unequal access to resources and opportunities between men and women, leading to gender inequalities. Therefore, **the concept of gender encompasses not only ideals or stereotypes of femininity and masculinity but also the social practices, relationships, and power structures that perpetuate these inequalities**[1–4].

Gender refers, then, to the roles, behaviors, activities, and attributes that a society, at a given historical moment, considers appropriate for men and women. In addition to defining relationships between men and women, gender also includes interactions among people of the same sex. These attributes, opportunities and relationships are socially constructed and learned through the socialization process, being specific to a context or period of time, and determine what is expected, allowed and valued in a woman or a man in a given context

For many feminist perspectives, the concept of gender also refers to the sociopolitical discourses that define and normalize both gender and sexuality, often excluding or stigmatizing other gender identities and sexual practices, which can lead to discrimination and violence against the LGBTQIA+ community (Lesbian, Gay, Trans, Bisexual, Queer, Intersexual, Asexual, plus)[1].

For this reason, it is also vital to understand and embrace the concept of **gender identity**, which refers to the individual's internal experience of gender. This

identity may or may not match with the biological sex assigned at birth, that is, the physical and biological attributes that categorize humans as male or female, such as chromosomes and sexual organs. Gender identity encompasses how one feels about their own body, which might lead to physical alterations if chosen, and is expressed through clothing, speech, and gestures[5,6].However, it is important to notice that, like the concept of gender itself, identities also vary and evolve over time, indicating that these concepts are not static nor fixed[5–7].

Access disparities in rights and opportunities based on gender shows the presence and perpetuation of structural inequalities. Therefore, advocating for and working towards **gender equality** is essential. This involves implementing strategies that acknowledge the varying needs and starting points of different individuals or gender groups, a fundamental step towards a human-centered development and the safeguarding of human rights.

Table 1: Examples of how gender inequality impacts people's health

For years, clinical trials have either excluded women or failed to analyze results by gender, leading to a limited understanding of how certain diseases and treatments affect women differently from men. This can result in treatments that are less effective or even harmful for women.
Furthermore, heart disease manifests differently in women than in men, but research and treatment protocols have largely been based on data from men, potentially leading to inappropriate diagnoses and treatments for women.
Additionally, individuals from the LGBTIQ+ community often encounter healthcare providers who lack training in their specific health needs, leading to misdiagnosis, inadequate care, or limited access to specialized health services such as hormone therapy or gender-affirming surgeries.
Furthermore, they often face discrimination from health providers, ranging from negative remarks to outright denial of care, which can discourage LGBTIQ+ individuals from seeking necessary medical care, increasing their long-term health risks.

Now then, is talking about gender and gender perspective the same thing?

Although these two concepts are related, gender and gender perspective are not the same. As mentioned in the previous section, **gender refers to the cultural processes that lead to the definition of what a society identifies as masculine and feminine.** These processes are built within the framework of a culture, meaning they do not come from nature, anatomy, or biological sex.

Gender perspective, or gender perspectives, refers to how these processes have been interpreted throughout history or at a specific moment in time[1,2,6]. In this sense, gender perspective can be understood as a **lens through which the world is viewed and analyzed**, allowing us to identify the existence of inequalities, biases, and gender-based violence present in society and to challenge the status quo that sustains and reproduces them. Since these perspectives have changed over time and across different societies, there is no single, immutable gender perspective. Instead, there have been various schools of thought, positions, and interpretations. All of them have promoted fairer and more equitable relationships among different genders, made visible the existing power relations in the organization of society and how people and their bodies are treated, and advocated for the full exercise and respect of the rights of people of all genders.

For this reason, **the gender perspective focuses on observing and analyzing the impact of gender on people's opportunities, roles, and social interactions, and then integrating this perspective into legislation, programs, policies, research, or organizations. The aim is to ensure a fairer and more inclusive approach that acknowledges existing gender inequities and power structures and seeks to address them**[1,2,6,8]. As we will be explored in the following sections, incorporating a gender perspective means evaluating the consequences for women, men, and other gender identities in any planned activity, including laws, policies, programs, and research, across all sectors and levels. The aim is to avoid the perpetuation of inequalities and to reformulate roles and identity models that affect the development of individuals and communities.

But, what happens **when gender inequality intersects with other dimensions that also undermines a person's opportunities for development and quality of life**?

This is where the concept of **intersectionality** becomes essential, as it helps to understand the complexity and multiple dimensions of gender inequality, and its impact on people's lives and health.

The **intersectional perspective, or intersectionality**, is an analysis and interpretation framework that helps to understand how multiple social identities at the individual level—such as gender, sexual orientation, race, ethnicity, religion, age, socioeconomic or educational background, or disability—intersect with social inequalities at the macro-social and structural levels, such as poverty,

racism, or sexism. These overlapping factors can shape how individuals experience and live their gender identity[1,4,5,9,10].

It is important to note that, from this perspective, **social categories like race, gender, socioeconomic status, or sexual orientation are not simply a "sum" of independent identities, but are interdependent and mutually constitutive**. This means that a single category cannot fully explain the unequal outcomes in access to health without considering the intersection with other identities. For example, the experience of a poor woman (gender and socioeconomic status) cannot be fully understood without considering the interaction between both categories. Thus, the intersectional perspective highlights the specific inequalities that arise from the combination—not just the sum—of a person's social categories, especially for those who belong to the most vulnerable and marginalized groups[10].

Like gender, **these identities are rooted in power structures that shape a person's opportunities and living conditions**. Applying an intersectional perspective seeks to recognize the intersection of gender and various identities, and to integrate a gender perspective in a way that acknowledges the diversity of experiences, ensuring that all individuals are included fairly and equitably[6,10].

In this way, **intersectionality provides public health with a critical interpretative and analytical framework that enables the analysis, rethinking, and modification of how inequalities and health disparities are researched and addressed.**

Why is gender considered a health determinant?

As mentioned in the previous sections, gender and other forms of discrimination influence behaviors, policies, and norms that impact people's health outcomes.

Gender is, therefore, a determinant of health with several key dimensions. First, **gender inequality endangers the health of millions of women and girls worldwide** due to the historical burden of inequality and deprivation of rights they face in their communities, homes, workplaces, and healthcare settings. Second, **this also applies to other gender identities**, which, due to stigma and discrimination, have less access to healthcare and, in many countries, to basic

rights. Third, addressing and uknowlidging gender norms, roles, and relationships allows for a better understanding of **how gender and its construction assign rights and obligations to individuals within a society**, and how these unequal power relations can influence health-seeking behavior, health outcomes, and people's lives[3].

For these reasons, because gender limits and affects people's health, it is crucial that the solutions developed to address this challenge incorporate a gender perspective from the very beginning.

Why is it important to integrate gender perspective and intersectionality into the IA and health research?

For many years, various disciplines and branches of **science**, including health and technology, **have conducted research without incorporating a gender perspective or intersectionality**. As a result, they **have often failed to consider how interventions differently impact populations based on gender** and other factors, and have frequently generalized findings based on male patterns as if they applied universally to the entire population. This leads to science based on stereotypes, perpetuates inequalities, overlooks differences, and introduces biases in the results. Research conducted responsibly at every stage should take these approaches into account to ensure its usefulness and representativeness[1,8,11].

In this context, it is important to highlight that **these approaches** are not just relevant for research focused on gender issues, oriented to women, girls, or diverse populations, or feminist studies. They **also improve the quality of all types of research throughout the entire research process.** For example, some projects will need to analyze sex or gender variables at every stage, while others should explore how the issue being studied may affect women and men differently, and how it interacts with social and cultural gender structures[1,11,12].

According to the **GRAS (Gender Responsive Assessment Scale)**[11,13], designed to evaluate gender perspective, **health research that incorporates**

gender perspective can be classified as: 1) gender-sensitive, 2) gender-oriented, or 3) gender-transformative. These levels consider whether gender norms, roles, and relationships are acknowledged in terms of resource access and control; whether gender-based health inequities are addressed; whether the specific needs of women and men are considered; whether gender equality is promoted; and whether strategies are implemented to change power relations between men and women. In contrast, **research that ignores the gender perspective either reinforces gender inequality or remains blind to it.**

Table 2: Gender Responsive Assessment Scale – GRAS

Gender discriminatory	Gender blind	Gender sensitive	Gender responsive	Gender transformative
Perpetuates gender inequality by reinforcing unbalanced norms, roles and relations Privileges men over women (or vice versa) Often leads to one sex enjoying more rights and opportunities than the other	Ignores gender norms, roles and relations Very often reinforces gender-based discrimination Ignores differences in opportunities and resource allocation for women and men Often constructed based on the principle of being "fair" by treating everyone the same	Considers gender norms, roles and relations Does not address inequality generates by unequal norms, roles or relations Indicates gender awareness, although often no remedial action is developed	Considers gender norms, roles and relations for women and men and how they affect access to and control over resources Considers women's and men's specific needs Intentionally targets and benefits a specific group of women or men to achieve certain policy or programme goals or meet certain needs Makes easier for women and men to fulfill duties that are ascribed to them based on their gender roles	Considers gender norms roles and relations for women and men and that these affect access to and control over resources Considers women's and men's specific needs Addresses the causes of gender-based health inequalities Includes ways to transform harmful gender norms, roles and relations The objective is often to promote gender equality Includes strategies to foster progressive changes in power relationships between women and men

Source: adapted from Gender Mainstream for Health Managers: a practical approach, WHO[14].

In this way, research that incorporates the gender perspective, at its different levels, examines whether gender dimensions represent a relevant category for the study and includes it when necessary, reflecting these findings in the analysis and dissemination[11,12].

Bringing a gender perspective into health research is crucial to ensure that findings are inclusive, representative, and unbiased. A truly transformative gender approach looks beyond simply comparing men and women—it involves recognizing how gender intersects with other social identities such as race, age, sexual orientation, and socioeconomic status. As mentioned above, these intersections influence health decisions and outcomes, so considering them is key to gaining a comprehensive[1,2,5,6,11].

This approach seeks to understand individuals within their cultural, socioeconomic, and livelihood contexts, and how these factors interact with gender to shape their experiences and choices[10–12]. **By analyzing inequalities among different groups and how these influence health decisions and** outcomes, it fosters critical learning and joint reflection between men and women. This process of reflection and questioning must involve diverse voices from across the socioeconomic and political spectrum, with the aim of challenging and changing the underlying norms and power relations that sustain inequalities.

Including gender as a key variable in research enables a more accurate understanding of the differences between men and women within the studied population. **Overlooking or superficially addressing gender issues can lead to incomplete, non-representative, and potentially biased results.** For instance, in medical research, it is essential to include both male and female patients to gain a comprehensive understanding, while in social research, all gender perspectives should be considered to reflect the true diversity of the population[8]. This approach ensures that research conclusions and applications are relevant and equitable for the entire population, ultimately promoting more equitable and inclusive health outcomes[11].

Despite progress, many research projects still fail to be gender-sensitive. This is partly due to ideological and political resistance and, in many cases, a lack of awareness regarding gender issues. In fact, the supposed gender neutrality in research often hides true gender blindness. This happens, for example, when gender stereotypes are interpreted as scientific truths or when rigorous analysis in terms of sex and gender is missing[1,2,5,6,8,11]. A common bias is the incorrect assumption that a research problem affects men and women in the same way,

which makes the differentiated impacts on each group invisible. Another frequent mistake is adopting the male perspective as the universal norm, ignoring both biological and socially constructed differences between men and women. This approach not only hides these differences but also tends to exacerbate or normalize them, further reinforcing inequalities[1,11,12].

How can we effectively incorporate gender perspective and intersectionality into Health AI developments?

Artificial Intelligence (AI) has the potential to transform healthcare systems across all care levels, optimizing processes such as planning, diagnosis, treatment, rehabilitation, and palliative care. However, **the development of AI strategies in healthcare faces significant challenges, including technical, ethical, political, and regulatory issues, as well as gender-related issues**. If these aspects are not addressed alongside technological progress, there is a risk of violating human rights, widening existing gaps, and reinforcing gender discrimination and stereotypes[15].

Table 3: Some examples of how gender biases can influence the development of AI algorithms in healthcare

Prediction of Pregnancy Complications: Some algorithms designed to predict pregnancy complications may be biased if they fail to adequately account for differences in the diverse experiences of women from various races, ages, or socioeconomic backgrounds. This could lead to inadequate care for women in underrepresented groups, raising risks for both the mother and the baby.

Mental Health: Algorithms that analyze speech or behavior patterns to diagnose mental health disorders, such as depression or anxiety, may be biased if trained mainly on data from men or a specific ethnic group. Since women and people from various cultural backgrounds may express symptoms differently, this can lead to underdiagnosis or overdiagnosis.

Pain Research: Algorithms designed to analyze pain and recommend treatments may underestimate women's pain, as it has historically been taken less seriously in medical settings. This bias in the data, where women's pain has been handled differently than men's, leads to AI that doesn't accurately capture women's pain experiences.

> **Breast Cancer:** In developing algorithms for breast cancer detection, if the training datasets do not include enough images of young women or women from different ethnic backgrounds, the algorithm may be less accurate for these populations. This could lead to misdiagnoses or missed detections in certain groups.

According to PAHO, the use of AI in public health must be guided by strong technical and ethical standards to reduce ethical risks in public health and related policies[16]. These standards are reflected in the eight guiding principles detailed in Table 4:

Table 4: Guidelines for developing AI in healthcare

Human-centered	AI solutions should prioritize people and not be seen as an end in themselves. As one of several technologies that can support public health, AI must always respect human rights.
Based on ethics	AI discussions, development, and implementation should be based on universally accepted ethical principles such as human dignity, beneficence, non-maleficence, autonomy, and justice.
Transparent	AI algorithms must always be developed using transparency-based approaches.
Data protection	AI developments must prioritize privacy, confidentiality and data security.
Scientific integrity	AI interventions must be reliable, reproducible, fair, honest, and accountable.
Open and accessible	AI tools and concepts should be made as open and shareable as possible..
Non-discriminatory	AI initiatives for public health must promote justice, inclusion, and equality.
Human-controlled technology	Automated decisions must include formal oversight and review by humans.

Source: adapted from La inteligencia artificial en la salud pública, OPS, 2021[16].

As can be inferred from the previous sections, incorporating a gender perspective in AI and health research aligns with these principles, especially in its focus on people, non-discrimination, ethics, and the protection of human rights.

Guiding questions

In this regard, **how can we practically conduct AI and health research with a gender perspective?**

In 2023, Ladysmith held a workshop with research teams on this subject[17] and they came up with several key responses to this question, outlined in Table 5:

Table 5: Key requirements for conducting AI research with gender perspective

Skilled researchers with sufficient knowledge of gender perspective and intersectionality	Transparency models for gender and intersectionality in the data, both in analysis and recognition of gender gaps	Diverse teams with adequate local knowledge of culture, backgrounds, and gender
Algorithms-based and validated data made openly, publicly available for scrutiny	Safe spaces for women and minority groups to train and progress in AI-driven research	Tools to bridge the digital gap, accessible to everyone, including those in limited access settings

Source: adapted from Gender at Work, Global South AI4COVID Program. What does it take to have gender- responsive AI- driven health research, LadySmith, 2023[17]

Based on these data[18] and our research teams' experience, CLIAS proposes a set of questions to help guide the integration of a gender perspective into research. These questions are designed to assist research teams in taking concrete steps during the design and implementation of their projects, **ensuring that AI developments are gender-sensitive, gender-oriented or transformative, as well as responsible.**

Table 6: Guiding questions for integrating a gender perspective in AI and health research

What technical aspects do you believe should be analyzed and considered to incorporate and account for gender perspective in the AI developments you are working on?
What barriers within your organization might make it difficult to carry out research with a gender perspective?
Is there gender diversity within the research team? How are tasks distributed among team members?
Does your research hypothesis take gender or intersectional issues into account? If so, which ones?
What is the origin of the data used in the project and who is represented in it?
Do you think there is any bias in your data? How could it be addressed or corrected?
Do the datasets used allow for exploring and identifying differences within the population (e.g., differences between men and women, or across ethnic, educational, or income groups)?
Are your data and codes auditable?
Are there specific metrics to measure gender equity in the model's outcomes?
Do any of the results aim to reduce or overcome gender barriers or gaps?
Have women and people from diverse gender identities been consulted about their needs and perspectives?
What strategies are considered to involve stakeholders, including researchers and affected communities, to collect feedback and analyze data?
Has the model been validated with diverse gender populations, and what were the results?
How do you plan to communicate the AI results and recommendations in an inclusive and equitable way?
What plans are in place for ongoing review to ensure the model remains gender-sensitive?
How will feedback from diverse gender groups be incorporated to improve the model and its implementation?

For further exploration of the research questions, we suggest reviewing the following document: https://aphrc.org/wp-content/uploads/2022/10/Incorporating-gender-and-intersectionality-in-Artificial-Intelligence-AI-models-and-algorithms.pdf and the tools available in: https://www.equalai.org/aia/

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