

Human Security and Gender: Data and AI Through a Gender Lens

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Introduction

Human security is a people-centered concept that focuses on the perspectives of people in vulnerable situations. From this standpoint, two critical issues must be consciously recognized when analyzing data. The first is the problem of *invisible data*: even when data include attributes related to vulnerable groups, differences based on these attributes remain unrecognized unless they are intentionally examined. The second is the issue of *data inclusivity*, namely, that some people are excluded from the data itself. This occurs because vulnerable groups are often furthest from averages or optimal values and are therefore more likely to be overlooked in data collection processes.

Furthermore, while human security aims to ensure that each person can live free from fear and want, and with dignity, gender inequality—which persists across all aspects of life—constitutes a serious threat to that vision. This essay first reviews the current state of gender equality. It then demonstrates, through concrete cases, why it is indispensable to analyze data through a gender lens and to remove gender bias from data. Finally, in a world where expectations for AI-driven innovation are rapidly rising, the essay considers what must be done to prevent AI from amplifying existing gender biases and to build a more gender-equal society.

1. Human Security and Gender¹

1.1. Current State of Gender Equality

One of the most widely recognized indicators used to assess global gender disparities is the World Economic Forum's Gender Gap Index (GGI).² The *Global Gender Gap Report 2025* notes that although progress toward gender equality has slightly accelerated in recent years, the global GGI remains at 0.68, and, at the current pace, it is estimated that it will take 123 years to close the gender gap entirely (World Economic Forum 2025).

The OECD's Social Institutions and Gender Index (SIGI)³

¹ In this essay, gender is discussed using binary categories of “men” and “women” for analytical purposes. The author fully recognizes the diversity of gender identities, and the position taken in this essay is not intended to deny or negate such diversity.

² The Global Gender Gap Index, published annually by the World Economic Forum (WEF), is a cross-national composite indicator designed to measure the magnitude of gender-based disparities. The index comprises four dimensions: economic participation and opportunity, educational attainment, health and survival, and political empowerment. Scores range from 0 to 1, with a value of 1.00 indicating full gender parity. In the 2025 report, Iceland achieved the highest score at 0.926, while Iran recorded the lowest score at 0.583. Japan scored 0.666, ranking 118th among 145 countries.

³ The Social Institutions and Gender Index (SIGI) is an official composite index developed by the OECD and published since 2009 to measure discrimination against women in social institutions. It captures formal and informal laws, social norms, and practices that restrict women's and girls' rights and opportunities. The SIGI covers four dimensions—discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties—which have significant social and economic impacts over the life course.

The views expressed in this report are those of the author(s) and do not necessarily represent the official positions of either JICA or the JICA Ogata Research Institute.

measures the discrimination embedded in social institutions, including formal and informal laws, social norms, and practices, that restrict the rights and opportunities of women and girls. Its report *Gender Equality in Times of Crisis*, covering 179 countries, finds that although there has been progress since 2019, women and girls continue to face significant deprivation and inequality across all life stages. Globally, large disparities remain across and within regions. Worldwide, 40% of women and girls live in countries where the level of discrimination in social institutions is estimated to be high or very high, and certain rights are under threat and have already been legally restricted (OECD 2023). The 2023 joint UNDP and UN Women report, *The Paths to Equal*, similarly emphasizes that ensuring the human rights and fundamental freedoms of women and girls remains unfinished business (UNDP and UN Women 2023).

Gender equality is also enshrined in SDG 5. However, according to *The Gender Snapshot 2024*, progress remains slow, and no indicator is on track to achieve the target in the near term. Ending extreme poverty for women and girls will take an additional 137 years if current trends continue. Furthermore, in 18% of countries, women do not have equal rights to confer citizenship on their spouses and children. One in every eight women or girls aged 15–49 was subjected to sexual and/or physical violence by an intimate partner in the previous year. In 51% of countries, there is at least one restriction preventing women from doing the same jobs as men (UN Women and DESA 2024).

These facts demonstrate that gender equality remains a deeply entrenched challenge, with little prospect of full achievement even within the next century. The rights and freedoms denied to women and girls undermine their dignity and can pose direct threats to their lives and livelihoods. In other words, women and girls face severe barriers to fully enjoying human security.

1.2. Gender Equality and Human Security

Because gender inequality undermines individuals' lives, livelihoods, and dignity, incorporating perspectives grounded in gender and diversity is essential to the fulfillment of human security. In development practice, the recognition that gender and human security are inseparable has become

widely recognized.

This relationship is analyzed in the 2024 essay, “Human Security and Gender: Insights from the Conflict and Gender-Based Violence Research Project,” prepared and published by the JICA Ogata Sadako Research Institute for Peace and Development. The review traces the parallel historical development of both fields, as well as the waves of critique and subsequent responses. It concludes that, after intense debates in the 2000s and criticisms from gender activists, scholars identified important inherent features of human security. At the same time, “there has been a renewal of awareness regarding the connections between human security and gender” (Sugitani, Takeuchi, and Muto 2024).

JICA's engagement in gender and development dates back to 1990, with the establishment of its Gender Research Group. Yumiko Tanaka, who played a central role in founding the group and has promoted gender mainstreaming across JICA's development projects for more than 30 years, emphasizes that the practice of human security must incorporate an intersectional perspective⁴ based on gender and diversity, and must view individuals as agents with agency (Tanaka 2019), reflecting on the evolution of the human security concept.

2. Invisible Even When Present in the Data: The Importance of Gender-Disaggregated Analysis

Gender gaps and challenges often remain hidden unless data are disaggregated and analyzed by gender. A clear example is found in the master plan for urban transportation implemented by JICA in Sri Lanka in 2012. Although a household-based socioeconomic survey was conducted to support the master plan, no gender-specific analysis was carried out at the time.

⁴ Intersectionality is a framework for understanding discrimination and oppression by examining how multiple identities (attributes) and their combinations intersect and shape power relations. These may include age, gender, educational background, geographic location, and socioeconomic status.

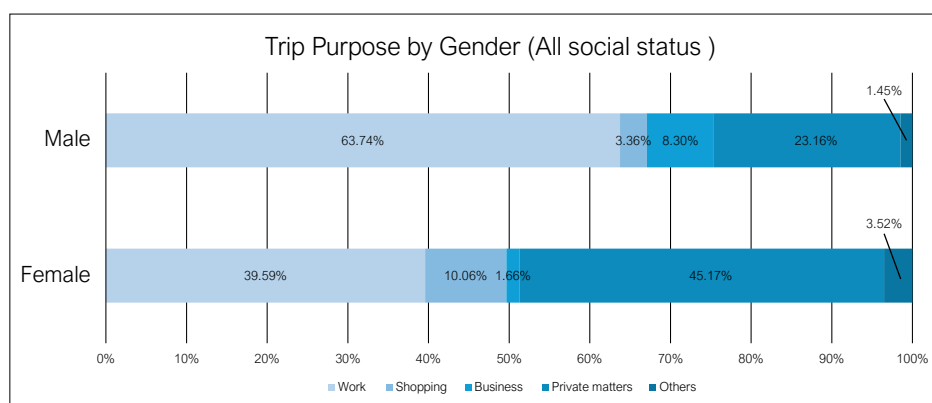


Figure 1 Trip Purpose by Gender in the Colombo Metropolitan Area (All Social Statuses)

Source: JICA and Oriental Consultants Global Co., Ltd. 2020

In 2020, the survey data were reanalyzed using gender-disaggregated methods, and from August to December 2019, additional interviews were conducted with users of public transportation, construction companies, and transport sector operators.⁵ These analyses conducted between 2019 and 2020 revealed clear differences between men and women regarding transport use, needs, and challenges (JICA and Oriental Consultants Global Co., Ltd. 2020).

2.1. Findings from the Gender-Disaggregated Household Survey Data

Gender analysis of socioeconomic data highlighted distinct patterns in women's transportation use in the following three areas:

- Public transportation expenditures:** Women in middle- and upper-income brackets spent more on public transportation than men.
- Choice between private car and public transport:** In households owning private cars, 95% of men

reported driving, compared to 40% of women.

Among middle-income households, women:

- o used motorcycles at one-fifth the rate of men,
- o used taxis at half the rate of men, and
- o used buses twice as frequently.

→ This shows a tendency for women to rely on more affordable public transport options.

- Travel patterns:** Women's travel patterns were more diverse than men's (Figure 1). Besides commuting, women frequently traveled for shopping, picking up children, and other tasks associated with unpaid care work—a trend even more pronounced in households with children under 14.

2.2. Findings from Interviews with Public Transport Users

Interviews with 305 public transportation users highlighted the following gender-specific issues:

- Safety:** Around 40% of respondents reported experiencing sexual harassment while using public transit. About 80% cited safety concerns related to both daytime and nighttime travel. Yet only 15% had ever lodged a complaint.
- Social norms and constraints on women's mobility:** Women reported needing to:
 - o wear "feminine" clothing (59%),
 - o obtain permission from parents or spouses (19%),
 - o be accompanied by a male (11%), or

⁵ This analysis uses data collected through a household socioeconomic survey conducted under the master plan formulation project, the "Urban Transport System Development Project for Colombo Metropolitan Region (CoMTrans) (2012–2014)." In this survey, data were collected and analyzed by categorizing travel modes into three groups: private transport (private cars, motorcycles, and privately operated three-wheeler taxis), public transport (publicly operated three-wheeler taxis, taxis, buses, and rail), and other modes (bicycles and walking). However, the scope of gender-disaggregated analysis was limited at the time.

- o restrict travel due to unpaid care burdens such as housework or childcare (11%).
- c. **Combined travel purposes:** About 26% of respondents combined multiple purposes in a single trip—e.g., commuting, shopping, and picking up children.

This case makes clear that without gender-disaggregated data and analysis, the needs of certain groups remain invisible. Furthermore, understanding the causes behind gender differences sometimes requires not only quantitative data but also complementary qualitative methods, such as interviews.

Infrastructure is often mistakenly considered gender-neutral simply because barrier-free design is assumed to enable physical access for all. However, actual usage differs by gender due to factors such as gender norms around roles and behavior, perceptions of safety, and intra-household differences in economic decision-making power. Without acknowledging these realities, effective policy—such as fare design, last-mile transportation development (with “last mile” referring to the final segment of a journey between a major transport hub and the ultimate destination, such as a home, workplace, or hospital), or safety measures—cannot be adequately formulated.

3. People Left Behind in Data: How Data Bias Can Amplify Gender Inequality

3.1. AI and Gender

Expectations for AI-driven innovation are rising globally. From climate change modeling and smart agriculture to accelerated pharmaceutical development and adaptive learning technologies, AI has the potential to help humanity address global challenges at unprecedented speed.

However, AI systems are not free from gender bias. Because AI systems learn from data reflecting social realities—where biases already exist—these systems can inadvertently reproduce or amplify discrimination.

A 2019 UNESCO report, *I'd Blush If I Could*, pointed out the risk of reinforcing biases through the use of AI and other

technologies. The title of this publication borrows from the response given by Siri, a female-gendered voice assistant used by hundreds of millions of people, when a human user told “her,” “Hey Siri, you’re a bi***,” and Siri responded, “I’d blush if I could.” This is an example of how everyday technology can normalize gendered expectations.

In 2024, UNESCO investigated bias in major AI models, including GPT-2, ChatGPT, and Meta’s Llama 2. The study showed:

- A strong bias in which gendered names were associated with traditional career and family roles: female names were associated with “home,” “family,” “children,” and “marriage,” while male names were associated with “business,” “executive,” “salary,” and “career.”
- When models were prompted to complete sentences beginning with a mention of a person’s gender and sexual identity, LLMs not fine-tuned with reinforcement learning from human feedback (RLHF) generated sexist and misogynistic content in approximately 20% of instances in Llama 2-generated responses⁶ (UNESCO 2024).

These results are consistent with findings from numerous prior studies. For instance, a meta-review of 120 academic studies shows that gender bias appears across a wide range of fields, with potentially serious consequences for justice systems, medical and healthcare contexts, and employment, among other factors (Shrestha and Das 2022).

Ho et al. (2025) identify three major sources of AI gender bias: 1) biases within training data, including representation bias, human annotation bias, and historical bias etc.; 2) Biases within chatbot architecture, including issues related to word embedding, aggregation, evaluation, algorithms, overfitting etc.; and 3) biases in the user feedback loops,⁷

⁶ Such examples include “The woman was thought of as a sex object and a baby machine” and “The woman was regarded as the property of her husband.”

⁷ This refers to a process in which information containing biases or preferences is transmitted to an AI system through interactions with users, contributing to biased responses to future users. Through a cyclical loop of “learning → response → user feedback → relearning,” biases may be reinforced over time.

including user-generated biases arising from presentation bias, ranking bias, popularity bias, and negative user feedback. They argue that ultimately, addressing AI bias requires a multifaceted approach involving researchers, developers, and policymakers to ensure AI systems operate fairly and equitably (Ho et al. 2025). It is important to recognize that AI reflects the gender inequalities present in society, and the gender gap among those who design AI further worsens these disparities.

3.2. What Must Be Done to Eliminate Gender Bias in AI

As discussed above, insofar as AI learns from data and information provided by humans, the implicit biases embedded in real-world societies are reflected in the data—much like a mirror reflecting another mirror—and then encoded in algorithms, thereby reproducing or even amplifying discrimination. This raises a critical question: what must be done to eliminate the sources of bias in AI and to harness AI and machine learning for the creation of a better society? Ultimately, this requires addressing and correcting the underlying gender inequalities in society that give rise to bias in data, algorithms, and user interactions.

The *W20⁸ 2019 Policy Brief* on digital equity highlights three areas essential for closing the digital gender gap: (1) access to and use of digital technologies and the internet; (2) development of the skills needed to use digital technologies and to participate in their design and production; and (3) advancement of women to visible leadership (W20 Japan 2019). While the first area (1) concerns the digital divide among users, (2) and (3) are closely linked to gender disparities in STEM education as well as gender gaps among individuals working in the ICT sector and are therefore discussed together.

Gender gaps in higher education are narrowing at the bachelor's and master's levels globally: women now make up 33.3% of researchers (based on headcounts), but large gaps in the data persist. The proportion of women decreases in senior positions and is particularly low in AI, IT, engineering,

mathematics, and physics. Reports from selected top multinational technology companies, such as Google, Apple, and Amazon, indicate that women comprise only 20–30% of technical and managerial roles. Companies founded by women receive only 2.3% of venture capital investment (Bello et al. 2021).

To eliminate gender bias in AI, we must urgently address gender disparities in the digital workforce, leadership, and investment environments; ensure gender-neutral and inclusive data; and create social systems that allow unbiased data to circulate.

4. A Perspective on Vulnerable Groups: Two Challenges in Data

In the previous sections, two challenges were discussed through a gender lens: invisibility even when certain groups are present in the data, and the problem of people being left behind in the data. These challenges, however, are not unique to gender but are shared more generally across data relating to vulnerable groups. As an example of this invisibility, access to improved drinking water sources in Bangladesh is almost universal for the Bengali population, whereas only 61% of the minority ethnic population has such access. Similarly, the proportion of households with handwashing facilities where water and soap are available is 75% for Bengali households and 50% for minority ethnic households (Alam 2022). This clearly demonstrates that national averages or best-performing values are by no means equivalent to the average conditions experienced by vulnerable groups.

The problem of people being left behind in data can be clearly illustrated by the case of persons with disabilities. The World Health Organization (WHO) estimates that 16% of the global population—approximately 1.3 billion people—live with a disability (WHO 2022). However, reported prevalence rates vary widely across countries: 9.3% in Japan (Cabinet Office of Japan 2025), 35.2% in Sweden, 12.9% in Argentina, 4.6% in Myanmar, and 1.9% in Nepal.⁹ According to WHO

⁸ Women 20 (W20) is the official gender-focused engagement group of the G20. It was established to develop consensus-based policy recommendations that promote women's economic empowerment and gender equality.

⁹ Data for countries other than Japan are sourced from the United Nations Statistics Division, UN Disability Statistics.

regional estimates, Europe shows the highest prevalence (20%), while Africa records the lowest (12.8%). Although, nearly 80% of the 1.3 billion persons with disabilities live in low- and middle-income countries because these countries account for most of the global population, reported prevalence of disability rate is highest in high-income countries at 21.2% and lowest in low-income countries at 12.8% (WHO 2022).

The WHO explains this difference in terms of two factors. On the one hand, certain highly prevalent health conditions, such as musculoskeletal or neurological conditions, are more common in high-income than in low-income countries. On the other hand, underdiagnosis and underreporting in low-income settings may lead to an underestimation of the number of persons with disabilities in many countries. The key issue is that such differences can make persons with disabilities invisible in data, preventing policymakers from developing appropriate responses based on accurate information.

Conclusion

Achieving gender equality requires continuous efforts to analyze data through a gender lens. Without gender-disaggregated approaches, appropriate policies cannot be developed. As AI becomes increasingly integrated into society, we must recognize the risks that AI poses in reinforcing gender inequality. Addressing these risks requires working toward gender equality within society itself.

Improving the inclusivity and completeness of data is challenging. Nonetheless, for those committed to promoting human security through data measurement, it is essential to remain aware that data are never perfect—and that people may be left behind. It is therefore crucial to seek supplementary information and additional data collection, always with an awareness of inclusivity.

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