



Women in African STEM Fields: Challenges and Progress

Richard Levine Department of Law, New Horizons University, Singapore

Daniel Young Department of Computer Science, Transatlantic Management School, Germany

George Hawkins Department of Information Technology, Alexandria School of Governance, Egypt

Abstract

The landscape of women's participation in STEM (Science, Technology, Engineering, and Mathematics) fields in Africa presents a blend of persistent hurdles and inspiring progress. As initiatives proliferate and the gender gap narrows in some regions, African women continue to break boundaries in STEM. However, deep-seated cultural, social, and institutional barriers continue to limit opportunities and advancement. This paper analyzes the current state, challenges, and advances for African women in STEM, highlighting statistical trends, key barriers, and promising interventions.

1. Introduction

STEM disciplines drive innovation and economic growth globally. In Africa—a continent experiencing rapid digital and scientific transformation—the inclusion of women in these fields is essential for addressing developmental goals and technological advancement. Despite historical gender imbalances, African women are increasingly prominent in scientific, engineering, and technological sectors, although representation remains uneven and fraught with obstacles^{[1][2][3]}.

2. Participation of African Women in STEM

2.1. Current Statistics

- Women constitute roughly **30% of all science professionals in Africa**^[1].
- **Less than 15% of engineering and technology researchers are women** in parts of West and Central Africa^[1].
- According to a UNESCO report in 2023, **fewer than 30% of STEM graduates in sub-Saharan Africa are women**^[4].
- Some regions show strong representation, such as **Tunisia (47-55% female participation in STEM)** and **Cape Verde (52%)**, but other countries lag far behind, e.g., **Guinea (6%)** and **Ethiopia (7.6%)**^[5].
- At African universities, **women comprise 47% of STEM graduates** at all levels, the highest regional share globally. However, this leads to less parity in industry and academic positions than enrollment figures may suggest^[6].

Country	Women in STEM (%)	Year/Source
Tunisia	47–55	2022–2025 ^[5]
Cape Verde	52	2016 ^[5]
Nigeria	23	2019 ^[2]
Ethiopia	7.6	2016 ^[5]
Guinea	6	2016 ^[5]
Sub-Saharan Africa (average)	<30	2023 ^{[3][4]}

3. Key Challenges Facing Women in African STEM

3.1. Cultural and Societal Barriers



- **Gender Stereotypes:** Persistent beliefs that STEM is “male territory” discourage girls from pursuing science and technology subjects from a young age^{[1][2][7]}.
- **Patriarchal Social Norms:** Expectations for women’s roles in families and communities often conflict with scientific careers or advanced studies, particularly in engineering and technology^{[2][7]}.

3.2. Institutional and Educational Obstacles

- **Limited Access to Quality Education:** Inadequate resources and lack of inclusive curricula disproportionately affect girls from rural and low-income backgrounds^{[1][2]}.
- **Lack of Female Role Models:** The visibility of successful women scientists is limited, reducing inspiration and mentorship for aspiring students^{[8][9]}.
- **Underrepresentation Beyond Graduation:** While university graduation rates are approaching parity, women are less likely to enter—or persist in—academic, research, or leadership roles in STEM fields^{[6][3]}.

3.3. Workplace and Career Challenges

- **Gender Bias and Discrimination:** From hiring practices to promotion, women face implicit and explicit bias, wage gaps, and limited advancement opportunities^[7].
- **Balancing Professional and Domestic Responsibilities:** Women often bear a disproportionate share of household duties, restricting time and resources for career development and research^{[7][10]}.
- **Sexual Harassment and Hostile Environments:** Reports of harassment and unwelcoming workplaces further deter women, particularly in male-dominated sectors^[7].

4. Progress and Success Stories

4.1. Rising Participation and Regional Success

Despite the challenges, Africa leads in STEM enrollment compared to global averages:

- **Africa has 47% female STEM university graduates**, surpassing Asia (41%) and North America (39%)^[6].
- Some countries, such as **Tunisia and Cape Verde**, exceed 50% female representation among researchers^[5].

4.2. Notable Achievements and Leaders

- **Regina Honu** (Ghana): Founder of Soronko Solutions, empowering women in tech through coding programs and digital literacy^[4].
- **Dr. Quarraisha Abdool Karim** (South Africa): Renowned epidemiologist whose work on HIV/AIDS has been globally recognized.
- **Dr. Isatou Touray** (Gambia): Prominent public health researcher and advocate for women in science^[4]. These role models demonstrate women’s capacity for innovation and leadership in critical STEM areas.

4.3. Policy and Programmatic Advances

- **Scholarship and Mentorship Programs:** Initiatives like Women in Tech Africa, Mawazo Institute, and African Women in Science and Engineering (AWSE) support women through financial aid, mentorship, and research grants^[4].
- **Government, NGO, and Private Sector Involvement:** There is a growing movement towards gender targets in research funding, workplace equality programs, and advocacy for early STEM education for girls^{[4][5]}.

5. Statistical Trends and Regional Comparison

Region	Proportion of Female STEM Graduates (%)	Reference
Africa	47	[6]
Asia	41	[6]
South America	41	[6]
Europe	42	[6]
North America	39	[6]



Oceania	38	[6]
---------	----	-----

Gap in the Workforce

- Globally, only **26% of the data and artificial intelligence workforce are women**^[11].
- In Africa, despite higher graduation rates, women remain underrepresented in leadership and research posts^{[6][5]}.

6. Illustrative Graphs and Figures

Figure 1: Female Graduates in STEM by Region (Latest Data)

Region	Percentage (%)
Africa	47
Asia	41
South America	41
Europe	42
North America	39
Oceania	38

[Adapted from *THE/UNESCO and Women in Science Africa reports*]^[6]

Figure 2: Barriers to Women's Participation in STEM (Africa, Survey Data)

Barrier	Prevalence (%)
Gender Stereotypes	20.7
Societal/Cultural Barriers	15.9
Lack of Female Role Models	~10
Lack of Supportive Policies	~10
Resource Constraints	8

[Compiled from *African Women in STEM: Paradigms And Limitations and UNESCO reports*]^{[1][2]}

7. Pathways Forward

7.1. Policy and Advocacy

- **Targeted Interventions:** Early STEM education for girls through hands-on science investigations and digital skills^{[4][12]}.
- **Scholarships and Funding for Women:** Expand financial support for university and postgraduate studies.
- **Promote Role Models and Mentorship:** Use media and conferences to highlight successful African women scientists and engineers.

7.2. Institutional Reform

- **Gender-Responsive Policy:** Universities and research bodies should implement flexible arrangements and address discrimination robustly^{[2][7]}.
- **Inclusive Work Culture:** Ensure safe, supportive, and inclusive workplaces, with zero tolerance for bias and harassment.

7.3. Community and Societal Engagement

- **Challenge Gender Norms:** Host dialogues, workshops, and media campaigns to combat stereotypes and encourage family support for girls in STEM.
- **Engage Men as Allies:** Foster support among male colleagues and leaders for gender diversity in STEM^[2].

8. Conclusion

Journal of African Development

Website: <https://www.afea-jad.com/>



Women's participation in African STEM fields is vital for the continent's social and technological progress. While statistics reveal promising improvements in tertiary education, formidable obstacles remain through all stages of education and professional advancement. Promoting gender parity requires a multifaceted approach—bridging educational gaps, confronting cultural stereotypes, advocating for gender policy reforms, and celebrating African women's scientific achievements. As the continent continues to innovate and grow, ensuring a truly inclusive STEM landscape will unlock Africa's full potential for coming generations.

End of Document

*
**

1. <https://www.unesco.org/en/articles/what-you-need-know-about-challenges-stem-africa>
2. <https://aau.org/wp-content/uploads/2021/05/Women-in-Science-October-2019-final-2.pdf>
3. <https://www.tandfonline.com/doi/full/10.1080/2331186X.2023.2273646>
4. <https://www.africanleadershipmagazine.co.uk/her-voice-in-science-unpacking-stem-careers-for-african-women-and-girls/>
5. <https://www.nepad.org/blog/heightening-participation-of-african-women-science-technology-engineering-and-mathematics>
6. <https://www.womeninscience.africa/africa-has-highest-proportion-of-female-stem-graduates/>
7. <https://digitalcommons.kennesaw.edu/cgi/viewcontent.cgi?article=1106&context=acist>
8. <https://www.sciencedirect.com/science/article/pii/S2452292923000449>
9. <https://www.ie.edu/insights/ideas-to-shape-the-future/idea/a-new-era-for-african-women-in-stem/>
10. <https://www.science.org/doi/10.1126/science.ads6767>
11. <https://www.unesco.org/en/gender-equality/education/digital-divide>
12. <https://blogs.worldbank.org/en/nasikiliza/horses-mouth-technical-education-changer-girls-interested-stem>