

Strengthening gender equality and
inclusivity in the national system of
Science, Technology and Innovation:



GHANA

COUNTRY PROFILE



Gender & Inclusivity
A PROJECT OF THE SCIENCE GRANTING COUNCILS INITIATIVE



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Strengthening Gender Equality and Inclusivity in Science, Technology and Innovation (STI) highlights the contextual factors driving gender and inclusivity disparities in STI in Ghana as well as options and strategies for addressing disparity gaps in some of UNESCO's STEM and Gender Advancement (SAGA) policy impact areas.

These impact areas are social norms and stereotypes, education (primary, secondary and tertiary), the career progression environment, research content and practice, policy and entrepreneurship and innovation.

This profile synthesizes important data for funding agencies, researchers, policymakers and other actors advancing gender equality and inclusivity in STI at country, regional and international levels.

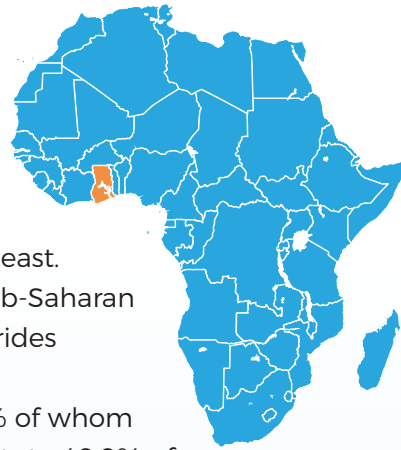
Acknowledgements

This country profile forms part of a series covering 15 Science Granting Councils Initiative (SGCI) African countries. It was produced as part of the SGCI Gender and Inclusivity Project, led by the Human Sciences Research Council (HSRC) of South Africa in partnership with Gender at Work, Jive Media Africa and the Council for the Development of Social Science Research in Africa (CODESRIA). The SGCI is a multi-funder initiative geared towards supporting the development of research and evidence-based policies that contribute to socio-economic development, with participating Science Granting Councils (SGCs) in Botswana, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Namibia, Rwanda, Senegal, Tanzania, Uganda, Zambia and Zimbabwe.

Suggested citation

Lynch, I., Essop, R., Middleton, L., Isaacs, N., Mensah, C., Akuffobebe-Essilfie, M., Semabla, J., Fluks, L., Agugua, A., Djoukouo, F., Kuetche, I., Ndinda, C., & Van Rooyen, H. (2023). *Strengthening gender equality and inclusivity in the national system of Science, Technology and Innovation: Ghana country profile*. Cape Town, South Africa: HSRC.

Country overview



Ghana is in West Africa on the Gulf of Guinea. It borders Côte d'Ivoire to the west, Burkina Faso to the north and Togo to the east.

Ghana gained independence in 1957, becoming the first sub-Saharan country in colonial Africa to do so, and has made significant strides towards democracy (World Bank, 2021).

The country has a population of over 32 million people, 58% of whom are urban-based and 42% rural-based. Women and girls constitute 49,9% of the total population (Ghana Statistical Service, 2021; World Bank, 2021).

Despite economic growth, income inequality is deepening and the country faces a cost-of-living crisis. Geographic inequality is stark, with rural poverty almost four times higher than urban poverty.

Ghana has challenges in achieving many of its Sustainable Development Goals (SDGs) and has regressed in some (Sachs et al., 2022; UN Women, 2020):

- Significant challenges remain for ending poverty and hunger (SDGs 1 and 2), ensuring decent work and economic growth (reducing the gender unemployment gap) (SDG 8), and reducing inequalities (SDG 10).
- There is moderate progress in quality education (SDG 4), especially in the 15-24 age group, and in access to clean water and sanitation (SDG 6).
- Gender equality (SDG 5) shows progress, but critical data gaps exist. As of 2020, only 40.1% of indicators are available for monitoring Ghana's SDGs from a gender perspective, with none for information and communication technology skills. Closing these gender data gaps is essential for achieving the country's gender-related SDG commitments.

Gender and inclusivity disparities negatively impact Ghana's human potential for socio-economic development

- Gender inequalities in Ghana are associated with laws, cultural norms and practices that hamper women's and girls' access to opportunities, resources and power. Structural drivers of gender inequality such as unequal gender roles and power relations between men and women persist across all social institutions, resulting in multiple forms of discrimination against girls and women (Alpin-Lardiés et al., 2019).
- Despite economic growth, women in Ghana continue to face barriers to formal, paid employment. Women are more likely to be employed in vulnerable sectors such as agriculture, are more likely to be poor, and have less control over their income. These gender gaps harm women's livelihoods and the potential for poverty alleviation and growth on a national level (Egyir et al., 2023; Twum & Dome, 2022; World Economic Forum, 2022).
- Unfortunately, the country has regressed in reducing gender disparities and discriminatory practices in the critical social institutions of the family, civil liberties, reproductive autonomy and access to productive and financial resources between 2019 and 2023 (Table 1, SIGI).
- Social attitudes studies in Ghana report a low tolerance towards people of different sexual identities and orientations compared to other SSA countries. The country has a greater tolerance of people of other religions (92%) and ethnicities (95%) and a slightly lower tolerance of immigrants and foreign workers (85%) (Howard, 2020).
- With the persistence of structural gender inequality Ghana performs poorly on various gender-disaggregated socio-economic development indices (Table 1). These indicators do not include data on intersecting marginalised identities and experiences of women and girls, e.g., rurality or disability, which hampers a nuanced picture of gender- and other inequalities in the country.

TABLE 1: Key gender indicators for Ghana

Human Development Index (HDI) (UNDP, 2021)	
<p>This index measures average achievement in human development in three dimensions: a long and healthy life (health), knowledge (education), and a decent standard of living (command over economic resources). The closer the value to 1, the higher the country's level of human development.</p>	<p>Ghana's HDI value of 0,632 falls within the low human development band of countries and is higher than the SSA HDI value of 0,547. The country is ranked 133rd out of 189 countries on the HDI.</p>
Gender Inequality Index (GII) (UNDP, 2021)	
<p>This index exposes the human development costs of gender disparities in three areas of human development: reproductive health (maternal mortality ratio and adolescent birth rate), empowerment (population with at least some secondary education; share of seats in parliament) and the labour market (labour force participation rate). The closer the score to 1, the more disparities between men and women and the greater the loss to human development.</p>	<p>Ghana has a GII value of 0,529, ranking it 130 out of 191 countries in the 2021 index. When the sub-indices disaggregate this value, a more nuanced picture of imbalances emerges.</p> <ul style="list-style-type: none"> ● Women hold only 14,5% of parliamentary seats, significantly lower than the SSA average of 25,7%. ● 58% of adult women have reached at least a secondary level of education, compared to 73,2% of their male counterparts; the figures are above the SSA averages of 31,1% for women and 44,3% for men. ● For every 100 000 live births, 308 women die from pregnancy-related causes, which is below the SSA average of 536. ● The adolescent birth rate is 64,2 births per 1 000 women of ages 15-19, lower than the SSA average of 101. ● Female (15 years and older) participation in the labour market is 64,5%, compared to 72,2% for men. The figures are higher than the SSA average of 62,1% for women and almost the same as the SSA average of 72,3% for men.
Social Institutions & Gender Index (SIGI) (Organisation for Economic Co-operation and Development, 2023)	
<p>This index assesses the extent of discriminatory social institutions- the complex web of formal and informal laws, social norms, and practices that limit women and girls' access to their rights, justice, opportunities for empowerment, and resources and undermines their agency and authority. A SIGI value of 0% indicates no discrimination and 100% very high discrimination in social institutions.</p>	<p>At 38,2 % in 2023, Ghana's social institutions showed an increase in discrimination against women compared with 34,5% in 2019. Discrimination in Ghana is highest in restricted civil liberties and lowest in limited access to productive and financial resources.</p> <ul style="list-style-type: none"> ● Restricted civil liberties (52,3%) capture social institutions that limit women's access to participation and voice in the public and social spheres. ● Family discrimination (44,3%) captures power distribution within households. It evaluates how much girls and women may be undervalued (e.g., child marriage rate, the gender gap in unpaid care and domestic work, and laws on divorce and inheritance). ● Restricted physical integrity (28,5%) captures social institutions that make women and girls vulnerable in these areas and limit their control over their bodies and reproductive autonomy (e.g., laws on violence against women, female genital mutilation, and reproductive freedom, the prevalence of intimate partner violence and percentage unmet needs for family planning). ● Restricted access to productive and financial resources (25,1%) captures women's restricted access to and control over crucial economic assets and resources, e.g., land ownership, bank account ownership, and the gender gap in management positions.
The Global Gender Gap Index (GGGI) (World Economic Forum, 2022)	
<p>This index measures gender-based gaps in access to resources and opportunities across four categories: economic participation and opportunity, educational attainment, health and survival, and political empowerment. The closer the score to 1, the higher the gender parity.</p>	<p>With a GGGI value of 0,672, Ghana has closed 67% of its gender gap, ranking 108 out of 144 countries globally and 21st out of 36 SSA countries. Resources and opportunities still need to be equal for men and women. When the sub-indices disaggregate this value, a more nuanced picture of imbalances emerges, with greater parity on health and survival and lower political empowerment.</p> <ul style="list-style-type: none"> ● Health and survival (98%) evaluate parity in sex ratio at birth and years of health life expectancy. ● Educational attainment (97%) evaluates parity on literacy rate (82%) and 100% parity on percentage enrolments in primary, secondary and tertiary education. ● Economic participation and opportunity (61%) evaluate parity on measures such as the labour force participation rate (89%), wage equality for similar work (70%), percentage of women legislators, senior/executive management (51%) and professional and technical workers (59%). ● Political empowerment (13%) evaluates parity in the percentage of women in parliament (17%), ministerial positions (33%) and years with a female head of state (0%).

STI and sustainable socio-economic development

- Ghana has a robust STI institutional arrangement consisting of legal and policy instruments, programmes and organizations aimed at positioning STI at the centre of the country's development agenda (Quaye et al., 2019).
- The responsibility for driving STI currently falls under the **Ministry of Environment, Science, Technology, and Innovation (MESTI)**. MESTI was founded in 1993, dissolved in 2006, reconfigured in 2009 as the Ministry of Environment, Science, Technology (MEST), and again in 2013 as MESTI.
- The **Directorate of Science, Technology, and Innovation (DSTI)** within MESTI, created in 2010, provides technical support to the Ministry on STI issues. This includes formulating STI policies and communicating and coordinating STI programmes and activities of all agencies, departments, research and development (R&D) institutions, academia and other stakeholders.
- The government adopted the first **National Science and Technology Policy (2000)** under the authority of the then Ministry of Environment, Science, and Technology (MEST). However, policy implementation suffered between 2001 and 2010 with the dissolution and reconfiguration of the MEST.
- MESTI launched the second **National Science Technology and Innovation Policy (2017-2020)**. The policy includes a focus on promoting full and equal participation of women in STI (MESTI, 2017).
- The **Coordinated Programme of Economic and Social Development Policies (2017–2024)** emphasises the essential role of STI “in all the productive sectors of Ghana’s economy and in the attainment of the SDGs” (Quaye et al., 2019, p. 2).
- Currently, the country’s STI policy landscape still lacks full integration of a transformative innovation frame that can support STI to “foster environmental sustainability, achieve more equitable income distribution and help address other social challenges including gender, inequality, and exclusion” (Quaye et al., 2019, p. 8).
- The country’s scientific **peer-reviewed publications and patents**, used as a measure of research and development (R&D) and innovation, indicate the following
 - Ghana’s scientific knowledge production is the fastest-growing in West Africa (UNESCO, 2021). Of the national research institutions and laboratories, the University of Ghana is currently the highest producer of scientific publications (World Intellectual Property Organisation, 2021).
 - The country has seen greater intraregional scientific collaboration, notably through partnering with scientists in Burkina Faso, Liberia, and Sierra Leone (UNESCO, 2021).

- Of the 15 countries participating in the Science Granting Councils Initiative (SGCI), Ghana (along with Kenya, Ethiopia, Uganda, and Tanzania) was one of the top five contributors of gender-related published papers in 2008-2017. During this time, Ghana increased the number of gender-related publications by 13%, double the regional average increase of 6% (Jackson et al., 2022) (see Figure 1).
- However, innovation, as measured by patent applications and registrations granted, remains low. Only 79 patents were granted to inventors in Ghana between 2015 and 2019, pointing to low commercial return on research results (World Intellectual Property Organisation, 2021).

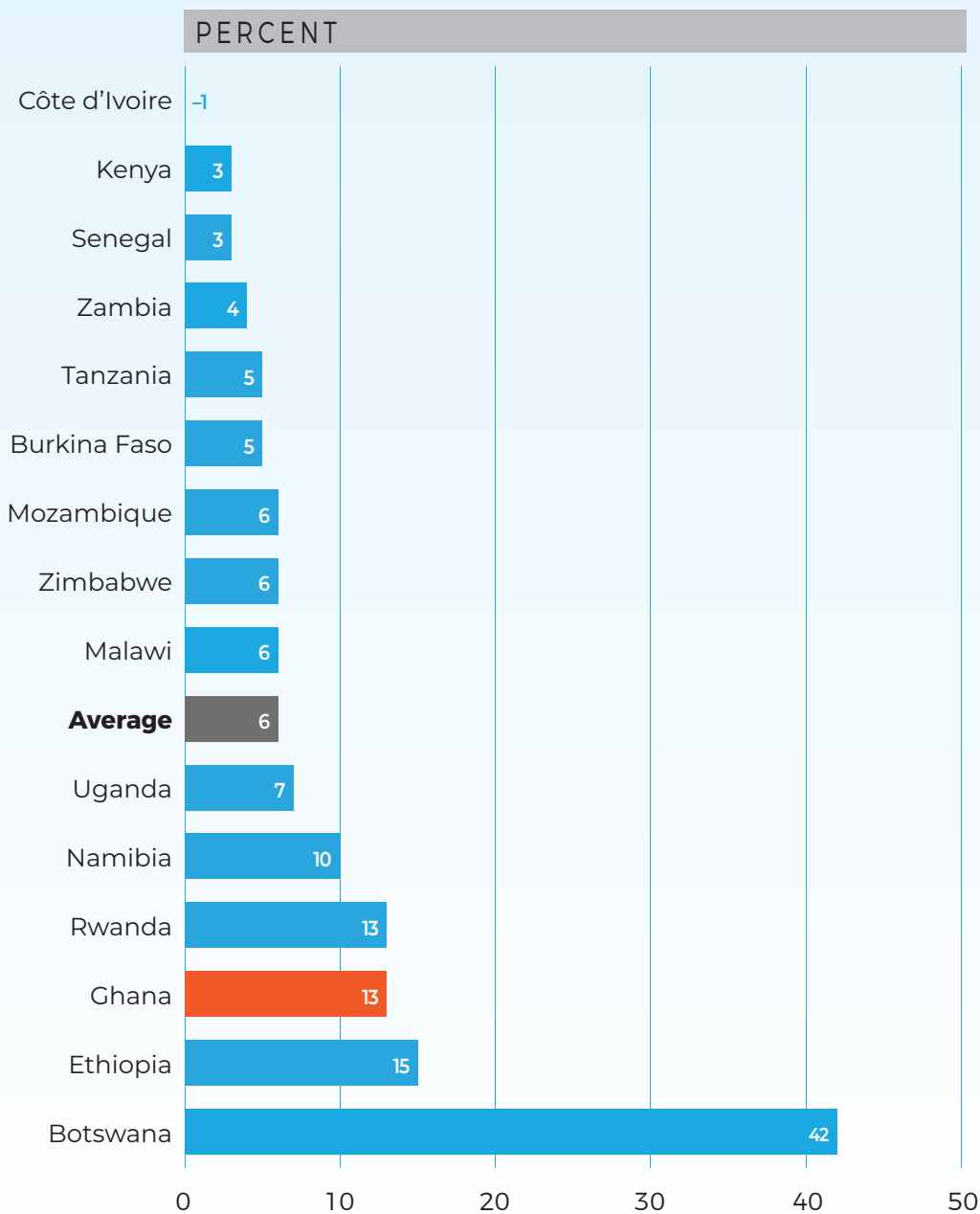


FIGURE 1: African SGCI Participating Countries: percentage (%) increase in publications with gender-related content between 2008 and 2017

Status of human capital for STI

- Gender disaggregated data gaps paint an incomplete picture of the status of human capital for STI in Ghana. A lack of regular data reporting on the pool of R&D personnel is a global challenge: “In 2018, 50 countries recorded the number of researchers (in head counts), down from 97 countries in 2015” (UNESCO, 2021, p. 47).
- Bearing this global data challenge in mind, in 2010 women constituted 18% of researchers in the country, increasing to 29% in 2015 (Unesco Institute for Statistics, 2021).
- The overall proportion of women in the R&D workforce in Ghana in 2010 was 22%, increasing marginally to 29% by 2015 (the most recent available data). For the category of researcher, women’s representation increased from 18% in 2010 to 26% in 2015 (Figure 2) (UIS, 2021).
- Overall, the R&D personnel at all levels is predominantly and disproportionately male (UIS, 2021).

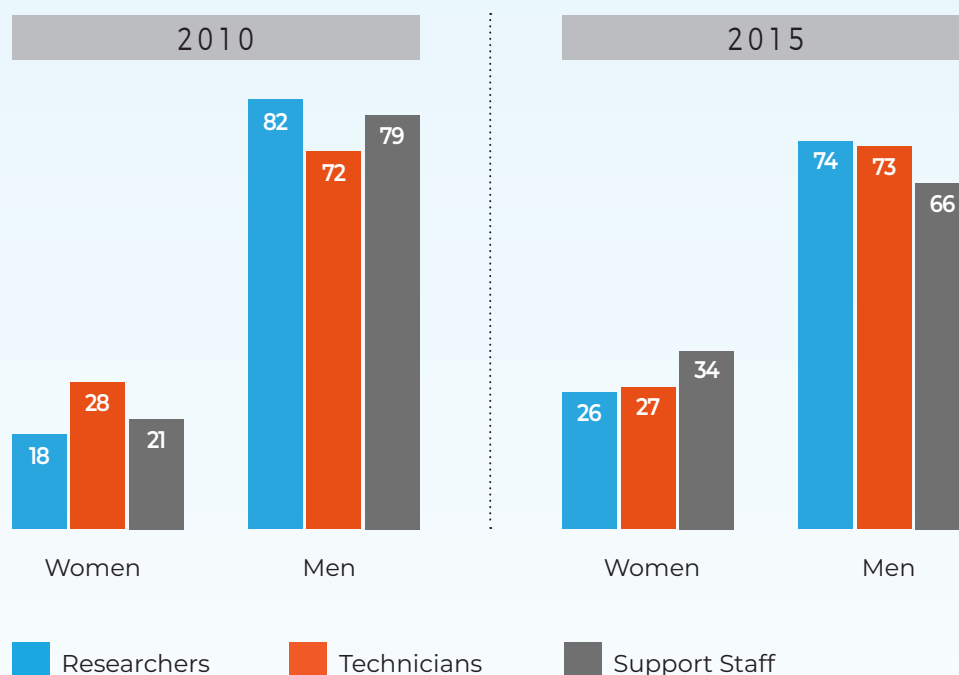


FIGURE 2: Proportion (%) of R&D personnel (headcount) by function and gender for 2010 and 2015

- Ghana’s distribution of researchers by scientific field in 2015 illustrates stark gender disparities across most fields, especially in Natural Sciences, Engineering, and Medical and Health Sciences (Figure 3) (UIS, 2021).
- The only fields where women are (somewhat) more prominent than men are Humanities and Arts, disciplines globally associated with higher female representation (Sato et al., 2021).

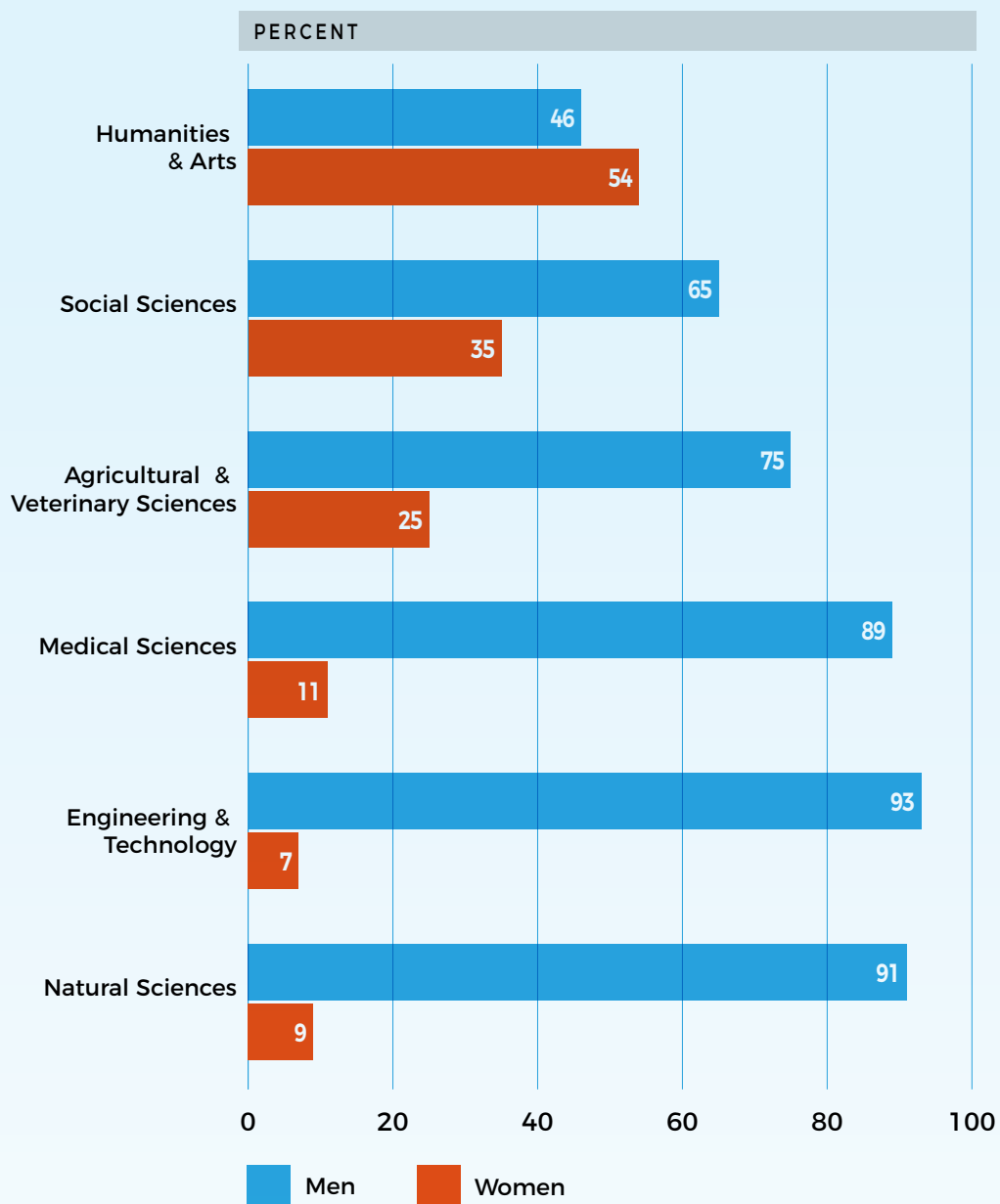


FIGURE 3: Distribution (%) of researchers (headcount) by scientific field and gender in 2015

- Distribution of researchers by field of employment in 2010 (Figure 4) shows that women in R&D were more concentrated in the non-profit sector (42%), followed by higher education (26%) and government (23%) (UIS, 2021).
- A critical data gap exists for women in R&D in the business enterprise sector (UIS, 2021).
- The lower presence of women in research in the public sector and higher presence in the non-profit sector warrant further exploration, in light of how male-dominated research cultures influence women's sustainable engagement in research.

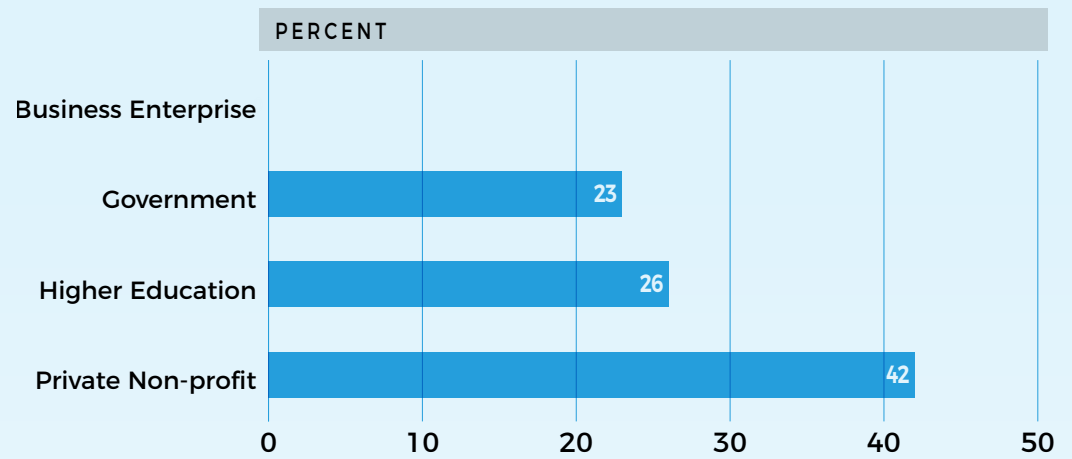


FIGURE 4: Proportion (%) of women in R&D by employment sector for 2015 (2010 for Non-Profit)

What factors encourage (or discourage) women’s participation in the national system of science, technology and innovation?

Policy and frameworks

- Ghana has a robust gender policy infrastructure, but implementation challenges and interlocking cultural, structural, and institutional systems perpetuate gender inequality and negatively impact women’s participation in STI.
- The country’s **Constitution (of 1992)** prohibits discrimination based on “gender, race, colour, ethnic origin, religion, creed or social or economic status” (Government of Ghana, 1992, p.12).
- The **National Medium-Term Development Policy Framework (2022-2025)** aims to “attain gender equality and equity in political and social development; promote economic empowerment of women and strengthen gender mainstreaming, coordination and implementation of gender-related interventions in all sectors” (National Development Planning Commission, 2021, p.94).

- The **National Employment Policy (2014)** recognises addressing gender inequality as critical to reducing unemployment for women. Policy objectives include the intention to “provide special assistance for the development of women entrepreneurship, and improve their access to credit, provide them adequate institutional support, remove cultural inhibitions, and provide them practical management training to become successful business women and effective role models in society” (Ministry of Employment and Labour Relations, 2014).
- The **National Gender Policy (2015)** intends to “mainstream gender equality and women’s empowerment concerns into the national development process to improve the social, legal, civic, political, economic and cultural conditions of the people of Ghana” (Ministry of Gender, Children and Social Protection, 2015).
- In addition, the **National Social Protection Policy (2015)** acknowledges gender equality and includes a policy principle directed toward mainstreaming gender issues. In this regard, the policy aligns itself with the National Gender Policy to improve “women’s empowerment and livelihoods; women’s rights and access to justice; women’s leadership and accountable governance; promoting gender equality in trade and industry; and gender roles and relations” (Ministry of Gender, Children and Social Protection, 2015).
- Moreover, the country’s **Affirmative Action Policy (1998)** provides a 40% quota for women’s representation on all government and public boards, commissions, councils, committees and official bodies, including the Cabinet and the Council of State, while women’s representation remains low. The country has made slow progress in passing the policy into law and implementing it in practice (National Development Planning Commission, 2021).
- To curb early marriage, the **Children’s Act (1998)** sets the legal age of marriage at 18 (Ahonsi et al., 2019).
- The **Inclusive Education Policy (2013)** defines inclusion as “ensuring access and learning for all children: especially those disadvantaged from linguistic, ethnic, gender, geographic or religious minority, from an economically impoverished background as well as children with special needs including those with disabilities”. The Ministry of Education acknowledges explicitly a responsibility to “ensure equal educational opportunity for young girls” (Ministry of Education, 2013).
- The **Re-entry to School Policy (2008)** attempts to address educational exclusion related to adolescent pregnancy. It allows pregnant girls to remain in school until six weeks before birth and to return six weeks after birth (Human Rights Watch, 2022).

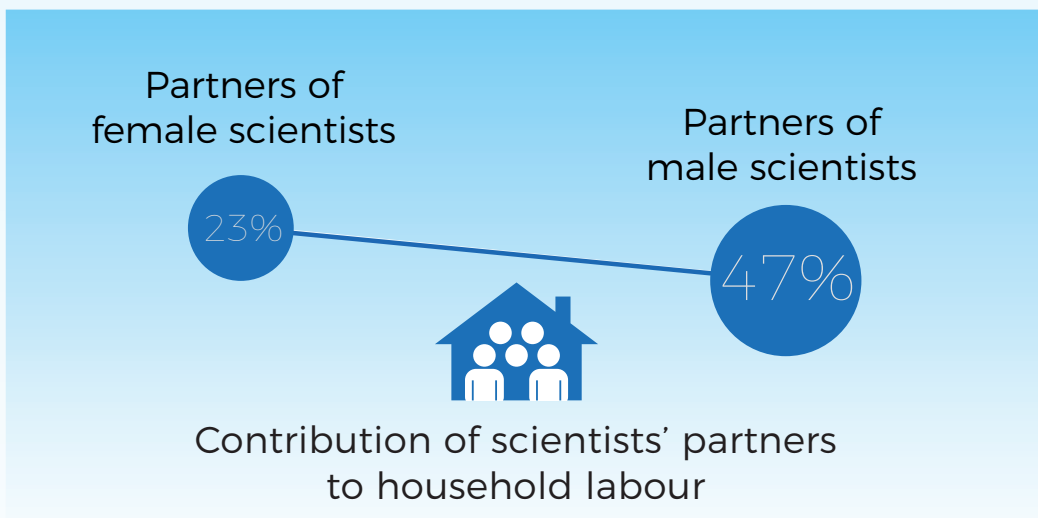
Gender social norms and the education pipeline

- Major education reform has resulted in gender parity in primary enrolment being near-complete, but gender gaps emerge as girls progress through each stage in school. Girls in rural areas, especially in the northernmost part of the country, face higher barriers to education (van de Waal et al., 2022; World Economic Forum, 2022).
- The persistence of child marriage, a lack of post-education opportunities for girls and women, poor menstruation management support in schools, school-related gender-based violence, and girls' and women's disproportionate household and agricultural work burden all contribute to gender disparities in educational attainment (Ahonsi et al., 2019; Kumbeni et al., 2021; UNESCO, 2020). Early pregnancy remains an educational barrier, acutely so for girls facing poverty, a lack of child-care and poor social support (Lambonmung et al., 2023).
- In Ghana young people with disabilities face significant educational disadvantages, being less likely to be enrolled in school and, if enrolled, less likely to complete their schooling. Girls with disabilities face additional gender-related barriers compared to their male peers (Mfoafo-M'Carthy et al., 2020; Opoku et al., 2021).
- Gender parity in early tertiary enrolment remains close to parity at the national diploma level (National Accreditation Board, 2020).
- Overall female enrolment in STEM programmes is less (44%) compared to males (56%) (National Accreditation Board, 2020).
- The gender gap widens at postgraduate tertiary level, with the percentage of women students enrolled in Masters' programmes at 37%. This number drops to 28% at PhD level (National Accreditation Board, 2020).
- Data gaps for tertiary education enrolment and graduation rates disaggregated by gender, degree type and field of scientific study frustrate a nuanced understanding of the gender-based, leaky pipeline in tertiary education, including for STI. A lack of data disaggregated by other stratifiers, such as disability status and rural location, further cloud efforts to address educational exclusion.

Gender science norms and the STI career progression environment

- In 2010 women constituted 18% of Ghana's researchers, increasing to 29% in 2015 (Unesco Institute for Statistics, 2021).
- Under-representation of women in STI in SSA is better explained by discriminatory practices that prevent women's participation in science, than by preferences for or aptitude in STI (Elu & Price, 2017). Gender-science stereotypes are perceptions that connect science achievements with men more than women, resulting in implicit and explicit bias against women in STI and negatively impacting their career trajectory (Huyer, 2019).

- Gender bias during grant review processes impacts women's success in securing research funding (Sato et al., 2021). A continent-wide study found that men received more funding than women in engineering and applied sciences (Prozesky & Mouton, 2019).
- Other factors constraining women's participation in STI include workplace sexual harassment, gender pay gaps, low job security for young women scientists who often hold contract positions, and a lack of mentors and role models (Mukhwana et al., 2020; Prieto-Rodriguez et al., 2022; Prozesky & Mouton, 2019; Sidelil et al., 2023). In academic institutions, women scientists generally have higher teaching, supervisory and administrative loads, leaving less time for publishing and fundraising. Interestingly, when controlling for this additional workload, women researchers in Africa publish more than their male peers (Beaudry et al., 2023).
- Overwhelmingly, the most widely cited structural barrier to women's full participation in STI is unequal gendered beliefs and expectations about their role as caregivers (Beaudry et al., 2023; Fisher et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). A study involving SSA countries, including Ghana, notes that balancing work and family life was reported as the most significant career challenge for 80% of women researchers. Overall, male scientists' partners contributed a much higher percentage (47%) than women scientists' partners (23%) to alleviating the household labour burden (Prozesky & Mouton, 2019).



- A study conducted in 17 African countries, including Ghana, compares the performance of men and women in STEM PhD programs (Fisher et al., 2020):
 - Men and women had similar completion rates, but women took longer to earn their PhD. This was attributed to women being more likely than men to take a break due to family reasons such as having children (11% of women compared to 2% of men). This delay in completion time for women is known as the 'motherhood penalty'.

- Women with a female supervisor, who attended an institution with gender policies in place, and pursued their PhD in a department where sexual harassment by faculty was perceived as uncommon were more likely to complete their program on time.
 - Marriage during PhD studies had different impacts on men and women. Women’s publication productivity decreased, while men’s increased, likely due to changes in domestic responsibilities associated with marriage. Research consistently shows that marriage benefits men while disadvantaging women regarding the division of household labour.
 - Gendered relationship norms also play a role: 33% of married women reported downplaying their successes and career prospects to avoid conflicts with their spouses.
- Interventions to address gender-related barriers in STI environments include implementing family-friendly policies and facilities that support women’s roles as mothers, incentivising men’s involvement in childcare, addressing workplace sexual harassment, and creating broader networks and linkages for women in STEM fields including mentoring and supervisory support (Fisher et al., 2020; Prieto-Rodriguez et al., 2022).
 - Networks of stakeholders with interest and influence in advancing gender and inclusivity in STI in Ghana aim to create an enabling and empowering environment for women in science. Examples of such stakeholders are the Ministry of Gender, Children and Social Protection (MoGCSP) which works in collaboration with MESTI to advance gender equality; the University of Ghana’s Centre for Gender Studies and Advocacy (CEGENSA); the Kwame Nkrumah University of Science and Technology’s Women in Science, Technology, Engineering, and Mathematics (WiSTEM); Women in Engineering (WiNE); and the Women in Construction Association.

Conclusion

Harnessing 100% of the country's human development for accelerated socio-economic development is entrenched in policy instruments across the STI pipeline. The Government has taken comprehensive policy measures to promote gender equality. The impact of this national gender policy is, however, tempered by inadequate implementation and structural barriers to equality, and the fallout is evident in persisting discrimination against girls and women across critical human rights and development domains.

In Ghana's policy context, gender equality and inclusivity considerations are conceptualised mainly in terms of male/female disparities. Social exclusion and disadvantage based on social factors beyond gender – such as disability, ethnicity, gender diversity, rural/urban location, and socio-economic status – are generally not meaningfully engaged in policy. Applying an intersectional lens to gender-related policy concerns will provide a more nuanced understanding of the interlocking systems of inequality that place women and other marginalised groups at a disadvantage in STI.

The absence of up-to-date education and R&D data disaggregated by sex, gender, and other diversity stratifiers hampers the ability of Government and other STI stakeholders to monitor policy implementation and impact. The government has committed to filling SDG data gaps through a National Data for the Sustainable Development Roadmap (UNESCO, 2021). Currently, very few science granting councils in SSA collect and make available gender and diversity-related data in their research and grants management processes (Global Research Council, 2021).

Publication trends show that Ghana is making strides in growing knowledge production on gender-related topics. Further investing in research to define and drive intersectional gender equality in STI is vital. Insights gleaned from such research will deepen understanding of the lived experience of girls and women in their diversity. Research to better understand gender and STI policy implementation gaps is also critical. These efforts will help the country attain equitable social, political, and economic development outcomes for its entire population.

References

- Ahonsi, B., Fuseini, K., Nai, D., Goldson, E., Owusu, S., Ndifuna, I., Humes, I., & Tapsoba, P. L. (2019). Child marriage in Ghana: Evidence from a multi-method study. *BMC Women's Health*, 19(1), 126. <https://doi.org/10.1186/s12905-019-0823-1>
- Beaudry, C., Prozesky, H., St-Pierre, C., & Mirnezami, S. R. (2023). Factors that affect scientific publication in Africa: A gender perspective. *Frontiers in Research Metrics and Analytics*, 8. <https://www.frontiersin.org/articles/10.3389/frma.2023.1040823>
- Egyir, I. S., O'Brien, C., Bandanaa, J., & Opit, G. P. (2023). Feeding the future in Ghana: Gender inequality, poverty, and food insecurity. *World Medical & Health Policy*, 1-34. <https://doi.org/10.1002/wmh3.578>
- Elu, J. U., & Price, G. N. (2017). Science labour supply in sub-Saharan Africa: Is there a gender disparity in preferences? *African Development Review*, 29(3), 367-375. <https://doi.org/10.1111/1467-8268.12274>
- Fisher, M., Nyabaro, V., Mendum, R., & Osiru, M. (2020). Making it to the PhD: Gender and student performance in sub-Saharan Africa. *PLOS ONE*, 15(12), 1-19. <https://doi.org/10.1371/journal.pone.0241915>
- Ghana Statistical Service. (2021). *2021 Population and Housing Census*.
- Global Research Council. (2021). *Gender-disaggregated data at the participating organisations of the Global Research Council: Results of a global survey*. Global Research Council.
- Government of Ghana. (1992). *Constitution of the Republic of Ghana*.
- Howard, B. (2020). *All in this together: Africans tolerant on ethnic, religious, national, but not sexual differences* (Dispatch No. 362). Afrobarometer. https://afrobarometer.org/sites/default/files/publications/Dispatches/ab_r7_dispatchno362_pap17_tolerance_in_africa_2.pdf
- Human Rights Watch. (2022). *Education access across the African Union: A Human Rights Watch Index*. <https://www.hrw.org/video-photos/interactive/2022/08/29/brighter-future-empowering-pregnant-girls-and-adolescent>
- Huyer, S. (2019). Is the gender gap narrowing in science and technology? In *UNESCO Science Report* (pp. 85-103). UNESCO.
- Jackson, J. C., Payumo, J. G., Jamison, A. J., Conteh, M. L., & Chirawu, P. (2022). Perspectives on gender in science, technology, and innovation: A review of sub-Saharan Africa's science granting councils and achieving the Sustainable Development Goals. *Frontiers in Research Metrics and Analytics*, 7, 814600. <https://doi.org/10.3389/frma.2022.814600>
- Kumbeni, M. T., Ziba, F. A., Apenkwa, J., & Otupiri, E. (2021). Prevalence and factors associated with menstruation-related school absenteeism among adolescent girls in rural northern Ghana. *BMC Women's Health*, 21(1), 279. <https://doi.org/10.1186/s12905-021-01418-x>
- Lambonmung, A., Acheampong, C. A., & Langkulsen, U. (2023). The effects of pregnancy: A systematic review of adolescent pregnancy in Ghana, Liberia, and Nigeria. *International Journal of Environmental Research and Public Health*, 20(1), Article 1. <https://doi.org/10.3390/ijerph20010605>
- Mfoafo-M'Carthy, M., Grischow, J. D., & Stocco, N. (2020). Cloak of invisibility: A literature review of physical disability in Ghana. *SAGE Open*, 10(1), 2158244019900567. <https://doi.org/10.1177/2158244019900567>
- Ministry of Education. (2013). *Inclusive Education Policy*.
- Ministry of Employment and Labour Relations. (2014). *National Employment Policy*.
- Ministry of Gender, Children and Social Protection. (2015). *Ghana National Social Protection Policy*.
- Mukhwana, A. M., Matanda, D., Omumbo, J., & Mabuka, J. (2020). *Factors which contribute to or inhibit women in Science, Technology, Engineering, and Mathematics in Africa*. The African Academy of Sciences.
- National Academies of Sciences, Engineering, and Medicine. (2020). *Pro mising practices for addressing the underrepresentation of women in science, engineering, and medicine: Opening doors*. The National Academies Press.
- National Accreditation Board. (2020). *Tertiary Education Statistics Annual Statistics Report 2019*.
- National Development Planning Commission. (2021). *Ghana National Medium-Term Development Policy Framework*.
- Opoku, M. P., Rayner, C. S., Pedersen, S. J., & Cuskelly, M. (2021). Mapping the evidence-based research on Ghana's inclusive education to policy and practices: A scoping review. *International Journal of Inclusive Education*, 25(10), 1157-1173. <https://doi.org/10.1080/13603116.2019.1600055>

- Prieto-Rodriguez, E., Sincock, K., Berretta, R., Todd, J., Johnson, S., Blackmore, K., Wanless, E., Giacomini, A., & Gibson, L. (2022). A study of factors affecting women's lived experiences in STEM. *Humanities and Social Sciences Communications*, 9(1), Article 1. <https://doi.org/10.1057/s41599-022-01136-1>
- Prozesky, H., & Mouton, J. (2019). A gender perspective on career challenges experienced by African scientists. *South African Journal of Science*, 115(3-4), 1-5. <https://doi.org/10.17159/sajs.2019/5515>
- Quaye, W., Akon-Yamga, G., Daniels, C., Ting, B., & Asante, A. (2019). *Mapping of Science, Technology and Innovation policy development in Ghana using the transformative change lens*. <https://www.tipconsortium.net/wp-content/uploads/2019/07/Ghana-5-pager.pdf>
- Sachs, J., Lafortune, G., Kroll, C., Fuller, G., & Woelm, F. (2022). *Sustainable development report 2022*. Cambridge University Press.
- Sato, S., Gygax, P., Randall, J., & Mast, M. (2021). The leaky pipeline in research grant peer review and funding decisions: Challenges and future directions. *Higher Education*, 82, 145-162.
- Sidelil, L. T., Spark, C., & Cuthbert, D. (2023). 'Being in science and at the same time being a woman is difficult': Academic women's experiences of gender inequalities in STEM academia in Ethiopia. *Women's Studies International Forum*, 98, 102717. <https://doi.org/10.1016/j.wsif.2023.102717>
- Twum, M., & Dome, M. (2022). *Amid persistent gender inequalities, Ghanaians call for government action to bridge the gaps*. Afrobarometer. <https://www.afrobarometer.org/publication/ad573-amid-persistent-gender-inequalities-ghanaians-call-for-government-action-to-bridge-the-gaps/>
- UIS. (2021). *Science, technology and innovation*. http://data.uis.unesco.org/Index.aspx?DataSetCode=scn_ds
- UN Women. (n.d.). *Malawi*. <https://data.unwomen.org/country/malawi>
- UN Women. (2020). *Making women count. Ghana*. <https://data.unwomen.org/country>
- UNESCO. (2020). *Global education monitoring report*. <https://unesdoc.unesco.org/ark:/48223/pf0000374514>
- UNESCO. (2021). UNESCO Science Report: *The Race Against Time for Smarter Development* (pp. 1-758). UNESCO Publishing. https://www.congreso.es/docu/docum/ddocum/dosieres/sleg/legislatura_14/spl_44/pdfs/38.pdf
- van de Waal, W., Ashon, M. A., & Comings, J. P. (2022). A case study of support for girls' access to primary school in Ghana. *PROSPECTS*. <https://doi.org/10.1007/s11125-022-09626-5>
- World Bank. (2021). *The World Bank in Ghana*. <https://www.worldbank.org/en/country/ghana>
- World Economic Forum. (2022). *Global gender gap report*. World Economic Forum.
- World Intellectual Property Organisation. (2021). *Global Innovation Index: Ghana*.

