IJEC
International Journal of Economics
https://ejournal.ipinternasional.com/index.php/ijec

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Gender Disparities in Science Labor Supply: Evidence from Sub-Saharan Africa

Tidiane Guindo[1], Mike Juni Elpisa[2], Nasri Bachtiar[3]
[1,2,3] Department of Economics, Andalas University, Padang, West Sumatera, Indonesia
Correspondence Authors: guindotidiane62@gmail.com
Article history: received June 13, 2025; revised June 26, 2025; accepted July 10, 2025

Abstract

This study investigates gender disparities in science-related labor supply preferences in Sub-Saharan Africa (SSA) using ordered logistic regression on data from Wave 7 of the World Values Survey (2017–2022) across Ethiopia, Kenya, Nigeria, and Zimbabwe. Analyzing seven attitudinal indicators toward science and technology, the findings reveal no evidence that women hold less favorable views than men; in some cases, women exhibit stronger pro-science attitudes. Key factors such as religiosity and education significantly influence science preferences, with higher education correlating positively and religiosity negatively, particularly in science-religion conflicts. The results suggest that structural barriers—not intrinsic gender differences in preferences—likely drive women's underrepresentation in STEM fields. Policy interventions should focus on dismantling institutional and socio-cultural constraints to enhance gender equity in SSA's science workforce.

Keywords: *gender disparity, STEM labor supply, ordered logit model*

INTRODUCTION

Science, Technology, Engineering, and Mathematics (STEM) skills are now being recognized as determinants of competitiveness, innovation, and economic growth. The World Bank (2023) insists that the development of STEM capacities is required for those countries that want to embark on sustainable development and technological advancement. However, despite the efforts of the international community towards improving gender equality, women remain underrepresented in STEM study and employment across the world. According to UNESCO (2021), women constitute only about one-third of all researchers globally, and approximately 35% of university STEM graduates are female (UNESCO, 2022).

It is most pronounced in the case of Sub-Saharan Africa (SSA). Women, for instance, account for fewer than 30% of engineering degrees in the majority of SSA countries and hold an infinitesimal percentage of scientific research positions (UNESCO, 2021). This disparity is also highlighted by evidence that, in countries like Ghana and Benin, women's enrollment in engineering courses remains less than 25%, and only 10% of engineering lecturers are women (Elu and Price, 2017). Such underrepresentation not only limits individual opportunities but also inhibits the field's ability to engage in inclusive and diversified scientific advancement. The historical gender imbalance among STEM subjects in SSA is influenced by a broad spectrum of factors, from societal expectations to barriers in education and the institutions

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

themselves. Through studies, it has been proven that cultural bias and gender stereotype normally deter girls from pursuing STEM courses at an early age (UNESCO, 2024). In addition, the lack of women professional role models and mentors in scientific career choices also partly results in the challenge, thus creating problems for little girls to envision successful working lives in STEM (IDRC, 2021).

It is both an economic imperative and a social justice concern to bridge this gender divide. The World Bank (2023) points out that SSA requires substantially more engineers and technical specialists to tackle its development challenges. Countries with stronger STEM human capital are usually capable of achieving higher productivity and growth rates. In addition, it has been proven that mixed teams provide more innovative solutions, and hence, women must be included in STEM fields for proper development (UNESCO, 2024). Closing SSA's gender gap in STEM must be multi-dimensional. This is achieved by implementing policies that promote gender-inclusive education, providing scholarships and grants to women pursuing STEM courses, and creating environments that support the participation of women in scientific studies and in leadership roles (UNESCO, 2024). Through the creation of an inclusive STEM environment, SSA can realize the full potential of its citizens, spurring innovation and sustainable development within the region.

There is an immense body of research that determines the drivers of gender gaps in STEM globally and in SSA. It has been determined that females do just as well, or even better, than male students in mathematics and science but still show decreased confidence and interest in the two subjects (European Commission, 2024). Social and domestic considerations are just as critical: social norm, parental influence, and the absence of feminine female models can discourage girls from taking STEM courses (European Commission, 2024; United Nations, 2024). In African contexts, UNESCO and others observe that both stereotypes and institutionalized prejudice still discourage most girls from science professions (United Nations, 2024). Empirical evidence indicates these effects: for example, women make up only about 20% of IT professionals in South Africa, and studies place some of the blame on gendered attitudes and gendered preferences for computing as a career (Calitz et al., 2020). At the same time, women's own self-reported attitudes towards science are not necessarily less favorable - indeed, one such earlier study based on World Values Survey (WVS) data concluded that SSA women's science attitudes were as favorable as men's (Elu and Price, 2017). These findings suggest that the STEM participation gap may be more a case of structural than women's disengagement from science.

Labor-market participation gender differences more broadly reinforce these trends. Labor-force participation and top-skill leadership by women around the world remain far behind those of men (The Global Gender Gap Report, 2023). In SSA, gender differentials in employment and income are extensively reported (Van et al., 2023), and STEM professions are no exception. The recent Global Gender Gap Report 2023 notes that women’s labor-force participation recovered only slightly after the pandemic, and in many regions remains far from parity. Filling these STEM gaps requires understanding all contributing factors. In particular, individual attitudinal preferences play a central role: labor supply in any field depends on personal preferences for that work. If women are equally interested in science as men (as is found by some studies), then gender differences in science labor have to be due to outside circumstances (e.g. prejudice, lack of encouragement) rather than internal interest (Elu and Price, 2017).

Despite this importance, few studies have explicitly examined gender disparities in science-related attitudes in SSA. The majority of African STEM writing points towards enrolment rates or overall workforce rates, and not the ambitions behind them. Elu and Price. (2017) provide an important exception: drawing on earlier WVS data (Wave 6), they assert that female attitudes towards science were no less positive than male attitudes across SSA. But this is an earlier analysis than many of today's school reforms and only included data up to 2014. To our knowledge, there has been no prior study using the latest World Values Survey data to replicate this result or explore cross-country variation. This

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

paper does. We analyze new attitudinal data from Wave 7 of the WVS (2017–2022) for four of the most significant sub-Saharan countries (Ethiopia, Kenya, Nigeria, and Zimbabwe) in an effort to ascertain if science labor supply preference differs between gender. We use WVS science and technology questions (e.g., agreement that science generates future opportunities or individual meaning of scientific knowledge) to construct science orientation indicators and estimate ordered logistic models to compare women's and men's responses. Our strategy departs from Elu and Price's methodology but substitutes it with new data and country-level focus. We describe the data and empirical strategy used to estimate gender variation in science labor-supply preferences in the next section.

The rest of this paper follows the following structure. In the second section, we present a theory framework for evaluating how preferences over labor supply are crucial in addressing the distribution of labor supply. Our theory framework provides a potentially causal relationship between gender, science attitude, science preference, and labor supply. Section III introduces our strategy for modeling attitudes towards science data in World Values Survey and our estimation strategy for assessing the impact of gender on Sub-Saharan African's preference for science. Section IV displays parameter estimates of an Ordinal Logit parameter specification of rank-ordered attitude towards science based on gender. The last section concludes.

THEORITICAL REVIEW

This study builds upon contemporary frameworks that model labor supply decisions under heterogeneous preferences. Recent research emphasizes that individuals' choices regarding consumption and labor supply are influenced by both observable characteristics and unobservable preferences, which are shaped by factors such as gender, education, age, and religiosity (Hoff et al., 2024). These preferences can be represented by a utility function $u_i(c_i, l_i)$, where c_i denotes consumption and l_i denotes labor supply. An individual's optimal choice maximizes utility subject to constraints like $c \leq w_i l$, where w_i is the wage rate.

To account for the influence of observable characteristics on preferences, we consider the preference ordering R_i as a function of a vector z_i, encompassing attributes such as gender, education, age, and religiosity. Thus, preferences can be expressed as $R(z_i)$, and the optimal consumption-labor choice becomes $(c_i, l_i, z_i) = \text{argmax} u(c, l, z_i)$ subject to the budget constraint. This framework allows for the examination of how individual utility comparisons, such as $u_i(c_i, l_i, z_i) \geq u_i(c'_i, l'_i, z'_i)$, imply preference comparisons $R(z_i) \geq R(z'_i)$, highlighting that labor supply decisions are inherently preference-driven.

Let Π represent the population distribution of individual preferences and Θ represent the distribution of optimal labor supply choices. There exists a functional mapping $f: \Pi[R(z_i)] \to \Theta[u_i(c_i, l_i, z_i)]$, indicating that the distribution of labor supply decisions across the population is directly shaped by the underlying distribution of preferences.

Applying this framework to the context of the STEM labor market, let $\Theta_S^F(s)$ and $\Theta_S^M(s)$ denote the cumulative labor supply distributions of females and males, respectively, for a given share $s \in [0,1]$ of STEM jobs. Assuming equal constraints and opportunities (ceteris paribus), any difference in STEM labor force participation between men and women can be interpreted as resulting from differences in their respective preference distributions: $\Theta_S^F(s) \neq \Theta_S^M(s) \Leftrightarrow \Pi_Z^F(z) \neq \Pi_Z^M(z)$. Hence, gender gaps in STEM employment could be rationalized, at least in part, by differences in male and female preferences for science and technology careers.

Recent studies support this perspective. For instance, Hägglund and Leuze (2021) found that adolescents' STEM career expectations are influenced by perceived labor market structures, with gender differences in expectations linked to national labor market characteristics. Similarly, Su et al.

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

(2023) demonstrated that gender differences in vocational interests align with employment patterns, suggesting that preferences play a significant role in occupational choices. Furthermore, research indicates that cultural and social factors shape these preferences. Meluzzi (2024) highlighted how exposure to peers from egalitarian cultures during college can influence women's labor market decisions, increasing their participation in full-time employment. This suggests that preferences are not solely individual but are also molded by social environments.

In the context of Sub-Saharan Africa, where systemic barriers and cultural norms may influence women's participation in STEM fields, understanding the role of preferences is crucial. If women possess comparable levels of interest and attitudinal support for science as men, yet remain underrepresented in STEM professions, this would suggest that structural barriers—rather than preference disparities—are the primary culprits. This aligns with findings from the European Commission's ESDE Review (2023), which emphasizes the impact of stereotypes and organizational cultures on women's representation in STEM occupations. By leveraging representative survey data from the World Values Survey (WVS), this study empirically tests the theoretical premise that preferences, shaped by individual characteristics and social contexts, influence labor supply decisions in STEM fields. Understanding these dynamics is essential for developing policies aimed at reducing gender disparities in STEM employment.

METHODS

This study draws on data from Wave 7 (2017–2022) of the World Values Survey (WVS), a large-scale cross-national dataset capturing public attitudes, values, and beliefs across over 80 countries. We focus on a sample from four Sub-Saharan African (SSA) countries: Ethiopia (ISO Code: 231), Kenya (ISO Code: 404), Nigeria (ISO Code: 566), and Zimbabwe (ISO Code: 716), based on data availability in Wave 7. These countries represent diverse linguistic, religious, and socioeconomic contexts within the SSA region.

The sample includes adult individuals (aged 18+) and employs national probability sampling designs. We restrict our analysis to respondents with valid and non-missing answers to the relevant science attitude and demographic questions. The final analytic sample size is approximately 4,200 to 4,300 observations per model, after excluding missing or invalid responses. Table 1 summarizes the WVS questions used to operationalize attitudes toward science. All responses are ordinal and reflect ranked agreement levels. In general, higher values denote more positive attitudes toward science, except for Q160 and Q169, where higher scores indicate stronger agreement with science-skeptical statements.

Table 1. World Values Survey (WVS) Science Attitude Questions

WVS Code	Survey Statement	Higher Value Meaning
Q158	Science and technology are making our lives healthier, easier, and more comfortable.	Stronger agreement (positive attitude)
Q159	Science and technology will create more opportunities for future generations.	Stronger agreement
Q160	We depend too much on science and not enough on faith.	More skepticism toward science
Q161	Science breaks down people's ideas of right and wrong.	More skepticism
Q162	It is not important for me to know about science in my daily life.	Stronger science disengagement
Q163	The world is better off because of science and technology.	Stronger agreement

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

WVS Code	Survey Statement	Higher Value Meaning
Q169	Whenever science and religion conflict, religion is always right.	Stronger religious over scientific trust

We interpret these items as preference-complementing, meaning that stronger pro-science attitudes may correlate positively with preferences for science-related behaviors, including labor market engagement in science sectors. This interpretation is supported by recent studies (Ajzen, 2020), which reinforce that stated attitudes often align with behavioral preferences. Hence, a positive association is expected between science attitudes and potential supply of science labor. Given the ordinal nature of the science attitude responses, we apply an ordered logistic regression (ologit) model, a well-established method for analyzing such data (Liu et al., 2017). Let a_i represent the unobserved latent preference for science, such that:

In line with the ordinal nature of the dependent variables, this study employs an ordered logistic regression framework to estimate how attitudes toward science vary across individual characteristics. The model assumes the existence of an unobserved, latent preference score for science, denoted as a_i, for each respondent i. This latent variable captures the underlying strength of pro-science attitudes that influence the respondent's observed answer on an ordinal scale. The model is specified as:

$$a_i^* = X_i\beta + \epsilon_i \quad \text{.....(1)}$$

Here, X_i represents a vector of explanatory variables including gender (coded as a binary variable for female), age, college-level education attainment, and religious affiliation. The parameter vector β captures the estimated effect of each explanatory variable on the latent preference score. The error term ϵ_i is assumed to follow a standard logistic distribution, consistent with the assumptions of ordered logistic models.

Since the latent variable a_i^* is not directly observable, the model estimates the probability that an observed ordinal response a_i falls within threshold values along the latent continuum:

$$a_i = m \quad \text{if} \quad \tau_{m-1} \le a_i^* < \tau_m \quad \text{.....(2)}$$

$$\Pr(a_i = m|X) = \Lambda(\tau_m - X\beta) - \Lambda(\tau_{m-1} - X\beta) \quad \text{.....(3)}$$

Where Λ denotes the cumulative logistic distribution function, and τ_m are the estimated cut-points separating the ordered response categories. e estimate seven separate models, one for each science attitude question (Q158– Q159, Q160, Q161, Q162, Q163 and Q169), using robust standard errors and restricting the sample to observations with complete data on all covariat.

Table 2. Description of Explanatory Variables

Variable	Description
Female(Q260)	Binary variable: 1 = Female, 0 = Male
Age (Q262)	Age of respondent (continuous, in years)
College(Q275)	Binary: 1 = University degree or higher (ISCED 6+), 0 = Less than college
Religious(Q273)	Binary: 1 = Identifies as religious, 0 = Not religious or atheist

Model performance was assessed using **log-likelihood**, **likelihood ratio chi-square (LR χ^2)** tests, and **pseudo R^2 statistics**. While the pseudo R^2 values are low—ranging from 0.0002 to 0.0023—this is consistent with attitudinal survey data, where variance explained is inherently modest. However,

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

several models (Q162, Q163, Q169) exhibit statistically significant LR χ^2 values, indicating that the inclusion of gender, age, education, and religiosity improves model fit relative to intercept-only models.

RESULTS

Table 3. Description and Summary of public attitudes toward science and technology

WVS Question Code	Question Wording	Response Coding	Mean	Number of Observations (α)
Q158	Science and technology are making our lives healthier, easier, and more comfortable.	1 = Completely disagree ... 10 = Completely agree	7.923044	4,626
Q159	Because of science and technology, there will be more opportunities for the next generation.	1 = Completely disagree ... 10 = Completely agree	7.852789	4,626
Q160	We depend too much on science and not enough on faith.	1 = Completely disagree ... 10 = Completely agree	5.511673	4,626
Q161	One of the bad effects of science is that it breaks down people's ideas of right and wrong.	1 = Completely disagree ... 10 = Completely agree	5.859706	4,626
Q162	It is not important for me to know about science in my daily life.	1 = Completely disagree ... 10 = Completely agree	4.215521	4,626
Q163	The world is better off, or worse off, because of science and technology.	1 = Completely worse off ... 10 = Completely better off	7.281453	4,626
Q169	Whenever science and religion conflict, religion is always right.	1 = Completely disagree ... 10 = Completely agree	1.637051	4,626

The descriptive statistics presented in Table 3 provide significant impressions of the general direction of public attitudes towards science and technology in four Sub-Saharan African countries. In general, the responses indicate an extremely positive image of science. The most agreed-upon statement is Q158, that "science and technology are making our lives healthier, easier, and more comfortable," with a mean score of 7.92. Similarly, Q159, which gauges optimism that science will create more opportunities for the next generation, also receives a high mean of 7.85. Q163, which evaluates if "the world is better off because of science and technology," comes next with a mean of 7.28. The high scores show that most of those surveyed in the region recognize and appreciate the overall benefits of science for individual and

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

societal development. Public confidence in the positive function of science appears to be a prevalent and general attitude.

On the other hand, mean scores for items that convey skepticism or concern about science—Q160 and Q161—are moderate. Q160, which reads that "we rely too much on science and not enough on faith," has a mean of 5.51, while Q161, which reads that "science undermines people's notions of right and wrong," has a mean of 5.86. These near-middle scores (on a scale of 1 to 10) are suggestive of a balanced outlook. While there may be some reservations that some respondents have about the moral and spiritual consequences of science, they are not eschewing science per se. What seems to be occurring, rather, is a sort of guarded acceptance, where science is embraced and valued but not without some degree of critical reflection, particularly in culturally or religiously sensitive realms. This finding is in line with existing literature from African settings, e.g., Guenther et al. (2022). This highlights that science can be approached critically together with strong support for its social role.

Most notably, however, the results for Q162 and Q169 also support the general pro-science mindset. Q162, which reads that "it is not important to know about science in daily life," receives a relatively low mean score of 4.21, indicating disagreement with the idea that science is not needed. More sensational, Q169—which states that "whenever science and religion conflict, religion is always right"—receives the lowest mean score of 1.64. This suggests quite strongly that most respondents do not believe that religion must automatically rank above science in case of conflict. This finding is particularly important considering the extremely religious nature of most societies in Sub-Saharan Africa. It mirrors the same observation made by Joubert et al. (2025), where they indicate that religious individuals in African contexts still have faith in scientists and science, even while maintaining strong religious beliefs.

Cumulatively, these descriptive results complement the regression analysis in confirming that support for science is the general perception among the respondents, regardless of gender. Most value the benefits and relevance of science to daily life, although some have moderate concern about its moral or spiritual impact. This is a pattern of general support, tempered by selective skepticism, that paints a nuanced but positive picture of public attitudes toward science in Sub-Saharan Africa. It also reaffirms the study's key finding that women are not more resistant to science than men and that attitudinal gender disparities in science are small or even reversed in some cases.

Table 4. Description and Summary of Regressors

Regressor	Description	WVS Question	Mean	Standard Deviation (α)
Female	Binary variable equal to 1 if respondent is female	Q260	0.4956487	0.5000317
Age	Respondent's age in years is female	Q262	33.5554	13.13239
Religious Person	Binary equal to 1 if respondent is a religious person	Q173	0.9394801	0.2384718
College	Binary equal to 1 if respondent has a university-level education with degree	Q275	0.0942651	0.2922312

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Table 4 presents summary statistics for the major explanatory variables employed in ordered logistic regression models. The gender balance is near parity in the sample, with 49.6% of the respondents categorized as female (mean = 0.496), which suggests that the analysis is founded on a representative cross-section of men and women in the four Sub-Saharan African countries examined. Such balance renders gender-based comparisons in attitudes towards science credible.

The average age of respondents is approximately 33.6 years (standard deviation = 13.13), reflecting a broad adult age representation in the sample. This makes it possible to test generation influences on attitudes to science, with reference to the literature showing age variation in trust and interest in science. The standard deviation indicates the presence of young and old participants, which contributes to the validity of age-concerned findings in the analysis.

The most striking feature of the dataset is the extremely high level of religious identification, with 93.9% of all participants being considered religious (mean = 0.939). This speaks to the very religious character of the societies under study and to the imperative of including religiosity as a key variable in the analysis. Given past research showing that religiosity can play a negative role in attitudes toward science—particularly when religion and science appear to be in contrast—this high frequency offers contextual understanding to the interpretation of results for Q169 and Q160.

Last, canonic 9.4% of respondents reported possessing a university-level degree (mean = 0.094), which is indicative of relatively low higher education completion rates among the sample. Such canonic constraint on canonic occurrence of tertiary education is consistent with overall educational trends in parts of Sub-Saharan Africa and has implication for the interpretation of the education-attitude relationship. The low proportion of university-educated individuals can partly explain education's effect on attitudes toward science, though it exists, being not always significant across models. The summary statistics in brief present a sample that is balanced by sex, varies extensively in age, is religious, and consists of a relatively small proportion of university-educated individuals. These characteristics are important background information for interpreting the regression findings and determining the manner in which these demographic and social factors interact with public opinion of science in the area.

Table 5. Ordinal Logistic Regression Results: Predictors of Attitudes Toward Science in Sub-Saharan Africa (Odds Ratios and p-values).

Dependent Variable (WVS Q#)	Female (OR, p)	Age (Q262) (OR, p)	College (OR, p)	Religious (OR, p)
Q158: "Science improves life"	0.93 (0.190)	1.00 (0.920)	1.10 (0.330)	1.03 (0.792)
Q159: "Science creates more opportunities"	0.99 (0.872)	1.01 (0.016)**	1.07 (0.467)	1.15 (0.214)
Q160: "We depend too much on science"	0.89 (0.031)**	1.00 (0.427)	0.94 (0.523)	1.01 (0.923)
Q161: "Science erodes moral values"	1.09 (0.101)	1.00 (0.099)***	0.99 (0.948)	1.09 (0.420)
Q162: "Knowing science not important in daily life"	1.15 (0.013)**	1.01 (0.002)**	0.70 (0.000)*	0.85 (0.130)
Q163: "The world is better off because of science"	0.89 (0.039)**	0.99 (0.014)*	1.18 (0.089)***	1.25 (0.047)**

IJEC
International Journal of Economics
https://ejournal.ipinternasional.com/index.php/ijec

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Dependent Variable (WVS Q#)	Female (OR, p)	Age (Q262) (OR, p)	College (OR, p)	Religious (OR, p)
Q169: "Religion is always right when it conflicts with science"	0.92 (0.166)	1.00 (0.888)	1.08 (0.453)	0.61 (0.000)*

Models estimated using gender, age, education level, and religiosity as predictors across six science-related outcomes and one religion-science conflict question.

Notes: Approximate p-values are in parentheses.

* Significant at the .01 level.

** Significant at the .05 level.

*** Significant at the .10 level.

Tale 6. Model Diagnostics and Goodness-of-Fit

Dependent Variable (WVS Question)	Log-Likelihood	LR chi^2	Prob > chi^2	Pseudo R^2
Q158 (healthier lives)	−7562.43	2.94	0.5678	0.0002
Q159 (future opportunities)	−7758.45	8.18	0.0854	0.0005
Q160 (too much science, not enough faith)	−9169.16	5.27	0.2602	0.0003
Q161 (science breaks moral norms)	−9099.46	6.69	0.1535	0.0004
Q162 (not important in daily life)	−8623.57	31.15	0.0000	0.0018
Q163 (world better off)	−8341.50	15.97	0.0031	0.0010
Q169 (religion vs science)	−4453.20	20.95	0.0003	0.0023

Table 5 presents the results of ordered logistic regressions estimating the relationship between science-related attitudes and a set of individual-level characteristics in four Sub-Saharan African countries (Ethiopia, Kenya, Nigeria, and Zimbabwe). Seven outcome measures are considered, each being one of the World Values Survey (WVS) items that measure attitudes toward science and technology as in Table 1. All the regressions have four regressors: female (1 = female), age (Q262), college degree, and religiosity, and are fitted by ordinal logistic regression models. Results are reported as odds ratios, and p-values, and thresholds (τ) that capture category boundaries on the ordinal outcome.

The variable of special interest as an explanatory one is gender, to check if female respondents systematically differ in science attitudes from males for the Sub-Saharan African context. An odds ratio bigger than 1 indicates greater chance of selecting more pro-science response (for positive science questions), while an odds ratio less than 1 indicates the reverse.

The empirical results shed light on the gender impact on science attitude in Sub-Saharan Africa. In Model 1, which examines the assertion "Whenever science and religion conflict, religion is always right" (Q169), the odds ratio of females is 0.92 (p = 0.166). This result is statistically insignificant, a sign of no significant gender difference in the manner in which respondents reconcile scientific thinking with religious teaching. Men and women are equally likely to endorse religious views over scientific explanations when the two are presumed to conflict with each other.

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Switching to Models 2, 3, and 7—positive attitudes towards science's role in society—findings show a more differentiated picture. These models correspond to questions of whether science and technology are improving the world (Q158), creating more opportunities for future generations (Q159), and generally improving the world (Q163). The odds ratio of the female group is 0.93 (p = 0.190) for Model 2 and 0.99 (p = 0.872) for Model 3, both of which indicate there is no gender difference in how the societal value of science is perceived. Model 7 (Q163) does show a significant difference, however: the p-value is 0.039 with an odds ratio of 0.89. It indicates that women are slightly more positive than men regarding the idea that science and technology make the world a better place. It is a statistically significant result that supports the argument that Sub-Saharan African women are as optimistic about science as men, if not more optimistic.

Models 4, 5, and 6 are focused on skepticism and aloofness from science. These are statements like "We rely too much on science" (Q160), "Science destroys moral values" (Q161), and "Science does not apply to everyday life" (Q162). In Model 4 (Q160), the odds ratio for being female is 0.89 (p = 0.031), and it indicates that women are far less likely to agree that society relies too much on science. Model 5 (Q161) shows an odds ratio of 1.09 (p = 0.101), which suggests no statistically significant gender difference in opinions concerning the impact of science on moral frameworks. Model 6 (Q162) shows, however, a gender difference: the odds ratio is 1.15 (p = 0.013), suggesting that women hold less often that science does not apply to daily life. Taken together, these findings indicate that women not only support positive attitudes towards science but also reject the view that science is not relevant to daily life.

Age, as measured by Q262, has small but statistically significant correlations with various science attitude outcomes. In Model 3 (Q159) and Model 6 (Q162), age has a positive correlation with pro-science attitudes in the sense that older respondents are more likely to value the social utility of science. However, in Models 5 (Q161) and 7 (Q163), there is an inverse relationship with age and positive science attitudes, which would suggest that generational or cohort effects can shape views on science in complex ways across age. Education is another strong predictor. In Model 6 (Q162), college graduates are over two times more likely to hold the view that science is applicable to their life, with an odds ratio of 0.70 (p less than 0.001). This supports the common perception that college education enhances scientific literacy and science appreciation in daily problem-solving.

Religious identity, as a dichotomous measure of being religious, has a constraining impact on science attitudes, particularly when science and religion disagree. Religious individuals in Model 1 (Q169) have an odds ratio of 0.61 (p less than 0.001) that means they are much more likely to make religious beliefs come first compared to scientific explanations. The overall trend of results does not show that Sub-Saharan African women are any less science-inclined than men. In fact, in many instances—particularly in Models 6 and 7—women are more favorable or engaged towards science.

DISCUSSION

Gender and General Science Attitudes: There is no evidence in our findings that women in Sub-Saharan Africa are more pessimistic about science than men; if anything, in some instances, they are even more pro-science in attitudes. This aligns extremely well with the findings of Cologna et al. (2025), who reported small but persistent gender differences in trust in scientists, with women being slightly more trusting. While their cross-national study showed that such distinctions were substantively irrelevant, our results confirm this by showing that women are as or more likely than men to avoid disengaged or cynical views of science (e.g., Q162: "science is not important in everyday life"). Similarly, Guenther et al. (2022) found no gendered differences in support for science with a South African online sample, which is highly aligned with our regression results for questions Q158 and Q159, where female coefficients were not statistically significant. This supports our overall conclusion that attitudinal gender differences do not explain the gender gap in STEM enrollment in SSA.

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Women's Attitudes toward Science Relevance and Skepticism: On questions where skepticism or perceived irrelevance were measured (e.g., Q160, Q161, Q162), women were less inclined than men to express disengaged or overly skeptical attitudes. For instance, the odds ratio for females in Q162 (science not applicable to daily life) was far greater than 1. This finding corroborates the argument by Guenther et al. (2022) that participants of either sex have the propensity to both believe in science and be skeptical. Our results record this sophistication: women in SSA appear to hold ambivalent yet positive attitudes towards science, and this concurs with international results that skepticism does not equal rejection (Cologna et al., 2025). The alignment of our Q162 and Q160 results with these studies is also evidence that women's relatively higher support for science is not incompatible with critical acknowledgment of its limitations.

Religion and Science Attitudes: Our findings confirm that religiosity negatively affects pro-science attitudes, particularly when religion and science are perceived to be in conflict (Q169). This is very much in line with McPhetres and Zuckerman (2018), who demonstrated that religiosity predicts lower science literacy and more negative science attitudes in Western societies. That being said, our results also complicate this view: despite a religiously dominant sample (93.9%), Q169 had a very low mean score (1.64), meaning that even religious SSA participants lean towards the rejection of the idea that religion should override science. This complication is also present in Falade (2019) and Joubert et al. (2025), who observed that African religious believers habitually integrate scientific ideas into their worldview. In this manner, while our finding on religiosity aligns with international studies in its suppressive effect, it varies by showing that strong religiosity does not always substitute for trust in science in the African context.

Education and Science Attitudes: As our regression testing confirms, higher education is positively correlated with favorable science attitudes, especially concerning the applicability of science to everyday life (Q162). This agrees with global findings such as those of Alper et al. (2024), which identified that education tends to generate higher confidence in scientists—albeit that their study also concluded that this correlation is weaker in high-corruption settings. Our findings, cross-cutting countries with perceived variable levels of corruption, show education having a statistically significant positive impact on some items (e.g., Q162), but not consistently across all models. Such partial consistency suggests that education is likely to improve pro-science sentiments in SSA but that it may be constrained by the local institution credibility and broader political circumstances, as also suggested by Alper et al.

Age and Science Attitudes: Age effects on science attitudes were uneven but statistically significant in some models. Positive and negative correlations varied by the science question, according to our results. For instance, older respondents were more likely to reject disengagement (Q162) but less likely to agree with faith in science in general (Q163). These results are in line with Cologna et al.'s (2025) muted trends of finding that age effects on trusting science were small but context-dependent. Similarly, Guenther et al. (2022) found that older South Africans were more accepting of science without question, while younger participants were more skeptical. Our study is in line with these outcomes and would suggest that SSA age effects are not uniform—youths will be more critical, but short of outright rejection.

Model Fit and Interpretation: Although our models have low pseudo R^2 values (0.0002 to 0.0023), this is to be expected in attitudinal studies when many affecting variables are not included. Likelihood ratio chi-square tests do, however, validate that models Q162, Q163, and Q169 are statistically significant, validating our inclusion of gender, education, age, and religiosity. These results are in line with those of Cologna et al. (2025) and Alper et al. (2024), who likewise concluded that socio-demographic characteristics explain little variation in trust in science. However, the sign and direction of our coefficients are mostly in line with the international literature, which indicates that our model, modest in explanatory power, provides robust and interpretable results for policy and academic discussion.

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

CONCLUSION

This study investigated gender disparities in science-related labor supply preferences in Sub-Saharan Africa by analyzing attitudinal data from four countries—Ethiopia, Kenya, Nigeria, and Zimbabwe—using Wave 7 of the World Values Survey. Our key objective was to examine whether women hold less favorable views of science and technology, potentially explaining their underrepresentation in STEM fields. Through ordered logistic regression models applied to seven attitudinal indicators, the study finds that women are not less inclined toward science than men. In several cases, such as belief in science's everyday relevance (Q162) or skepticism about science's role being excessive (Q160), women demonstrated stronger pro-science orientations.

These results hold significant implications for both theory and policy. First, they offer empirical support to the theoretical premise that labor supply decisions in STEM are shaped not only by market conditions but also by individual preferences and attitudes, as suggested by recent studies on heterogeneous labor supply behavior (Hägglund & Leuze, 2021; Su et al., 2023). Our findings indicate that gendered labor market outcomes in STEM in SSA cannot be explained by a lack of interest or attitudinal disengagement on the part of women. Instead, they suggest that other systemic barriers—such as limited educational access, institutional discrimination, or sociocultural constraints—are more likely to be driving the persistent underrepresentation of women in science and technology professions.

Second, the study confirms that religiosity exerts a dampening effect on pro-science attitudes, particularly in situations where religion and science appear to conflict. While this aligns with earlier findings (e.g., McPhetres & Zuckerman, 2018), our analysis shows that even in deeply religious contexts like SSA, most individuals do not automatically subordinate scientific reasoning to religious doctrine (Q169 mean = 1.64). This reinforces the point made by scholars such as Joubert et al. (2025) and Falade (2019): in African societies, religion and science often coexist within personal worldviews, suggesting that policy interventions to improve science engagement need not confront religiosity head-on but rather work alongside it, promoting narratives of compatibility.

Third, education consistently emerged as a significant driver of science-oriented attitudes, echoing findings from Alper et al. (2024). Respondents with college-level education were more likely to view science as relevant to daily life and beneficial for society. Yet, given the low proportion of tertiary-educated individuals in our sample (just 9.4%), the overall impact of education on science attitudes may be muted by access and quality limitations in many SSA countries. This implies that expanding access to quality education—especially for girls and marginalized groups—remains a vital strategy for fostering science-supportive mindsets and increasing labor supply in science fields.

Fourth, age-related effects were mixed, confirming that science attitudes vary across generational lines but without a consistent directional trend. Younger individuals appeared slightly more skeptical in some models, while older respondents demonstrated stronger pro-science views in others. These results support the assertion made by Cologna et al. (2025) that age differences in science trust are context-dependent and shaped by exposure, education, and cultural narratives rather than biological age alone. From a methodological standpoint, although the models yielded low pseudo R^2 values (0.0002 to 0.0023)—a common feature in attitudinal research—the statistical significance of several models (especially Q162, Q163, Q169) demonstrates that gender, age, education, and religiosity together provide meaningful insights into variations in science attitudes. The robustness of these patterns across multiple models strengthens the validity of our conclusions and provides a solid empirical basis for policy recommendations.

The implications of these findings are substantial. If women in SSA are as or more interested in science as men, then policies aimed at increasing female participation in STEM should not focus on changing women's attitudes—but rather on eliminating the external barriers that restrict their engagement. These may include targeted scholarships, mentorship programs, anti-bias training in education and

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

hiring, improvements to school infrastructure, and media campaigns to challenge gender stereotypes in science. Furthermore, the high religiosity observed in the sample highlights the importance of culturally sensitive communication strategies. Science promotion in SSA should collaborate with community and religious leaders to build trust and legitimacy rather than opposing religious values. Future research should explore the causal pathways through which attitudes toward science are translated—or blocked—from affecting real labor market behavior. Longitudinal datasets, experiments, and qualitative studies could help disentangle how pro-science attitudes among women evolve over time and how they interact with opportunity structures, institutional biases, and informal networks. Expanding the country sample and examining the roles of ethnicity, urban-rural divides, and language could also yield more nuanced insights.

REFERENCES

World Bank, 09/2023. *Empowering Africa's future: Prioritizing STEM skills for youth and economic prosperity.* https://blogs.worldbank.org/en/education/empowering-africas-future-prioritizing-stem-skills-youth-and-economic-prosperity

UNESCO. (2021, February 11). *One in three researchers is a woman*. UNESCO. https://www.unesco.org/en/articles/one-three-researchers-woman

UNESCO. (2022). *Girls' and women's education in science, technology, engineering and mathematics (STEM)*. UNESCO. https://www.unesco.org/en/gender-equality/education/stem

UNESCO. (2024). What you need to know about the challenges of STEM in Africa. Retrieved from https://www.unesco.org/en/articles/what-you-need-know-about-challenges-stem-africa

IDRC. (2021). Breaking barriers: understanding obstacles facing women in STEM in the Global South. Retrieved from https://idrc-crdi.ca/en/news/breaking-barriers-understanding-obstacles-facing-women-stem-global-south

Calitz, A. P., Cullen, M., & Fani, D. (2020, April). The influence of culture on women's IT career choices. In *Conference on e-Business, e-Services and e-Society* (pp. 345-357). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-45002-1_30

Elu, J. U., & Price, G. N. (2017). Science Labor 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

The Global Gender Gap Report. 2023. World Economic Forum, Cologny/Geneva CH.

Van den Broeck, G., Kilic, T., & Pieters, J. (2023). Structural transformation and the gender pay gap in Sub-Saharan Africa. *Plos one*, *18*(4), e0278188. https://doi.org/10.1371/journal.pone.0278188

Hoff, K. A., Granillo-Velasquez, K. E., Hanna, A., Morris, M., Nelson, H. S., & Oswald, F. L. (2024). Interested and employed? A national study of gender differences in basic interests and employment. *Journal of Vocational Behavior*, *148*, 103942. https://doi.org/10.1016/j.jvb.2023.103942

Hägglund, A. E., & Leuze, K. (2021). Gender differences in STEM expectations across countries: How perceived labor market structures shape adolescents' preferences. *Journal of Youth Studies*, *24*(5), 634-654. https://doi.org/10.1080/13676261.2020.1755029

Meluzzi, F. (2024). The College Melting Pot: Peers, Culture and Women's Job Search. *arXiv preprint arXiv:2409.20225*. https://doi.org/10.48550/arXiv.2409.20225

European Commission. (2023). *ESDE Review 2023*. https://op.europa.eu/webpub/empl/esde-2023/chapters/chapter-2-5.html

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human behavior and emerging technologies*, *2*(4), 314-324. https://doi.org/10.1002/hbe2.195

Liu, Q., Shepherd, B. E., Li, C., & Harrell Jr, F. E. (2017). Modeling continuous response variables using ordinal regression. *Statistics in medicine*, *36*(27), 4316-4335. https://doi.org/10.1002/sim.7433

Cologna, V., Mede, N.G., Berger, S. *et al.* (2025). Trust in scientists and their role in society across 68 countries. *Nat Hum Behav* **9**, 713–730. https://doi.org/10.1038/s41562-024-02090-5

e-ISSN: 2961-712X
Vol. 4 Issue 2, July-December 2025
DOI: **10.55299/ijec.v4i2.1258**

Guenther L, Reif A, Taddicken M, Weingart P. Positive but not uncritical: Perceptions of science and technology amongst South African online users. S Afr J Sci. 2022;118(9/10), Art. #11102. https://doi.org/10.17159/sajs.2022/11102

McPhetres, J., & Zuckerman, M. (2018). Religiosity predicts negative attitudes towards science and lower levels of science literacy. *PloS one*, *13*(11), e0207125. https://doi.org/10.1371/journal.pone.0207125

Falade, B. (2019). Religious and traditional belief systems coexist and compete with science for cultural authority in West Africa. *Cultures of Science*, *2*(1), 9-22. https://doi.org/10.1177/209660831900200102

Alper, S., Yelbuz, B. E., Akkurt, S. B., & Yilmaz, O. (2024). The positive association of education with the trust in science and scientists is weaker in highly corrupt countries. *Public Understanding of Science*, *33*(1), 2-19. https://doi.org/10.1177/09636625231176935

IDRC. (2021). Breaking barriers: understanding obstacles facing women in STEM in the Global South. Retrieved from https://idrc-crdi.ca/en/news/breaking-barriers-understanding-obstacles-facing-women-stem-global-south