

# The Status, Stories & Experiences of Arab-Kuwaiti Women Enrolled in STEM Workplaces

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**Abstract:** Throughout the history of STEM, women have made significant strides towards narrowing gender gap in scientific and technical fields. However, there remains an under-representation of women in leadership positions. The term STEM—Science, Technology, Engineering, Mathematics, and Medicine—has gained prominence as a focal point for global discussions on gender equality. Addressing the persistent underrepresentation of women in STEM requires a deeper understanding of their pathways, challenges, and lived experiences. The objective of this research is to examine the extent of women’s participation in STEM workplaces and academic programs, with particular focus on Kuwait. This study adopts a mixed-methods approach, utilizing interviews and questionnaires to document perspectives in greater depth. The work is driven by three guiding questions: (1) What factors motivate women to pursue STEM majors? (2) What underlying causes contribute to gender gap in STEM workforce? (3) What barriers and challenges do women encounter in STEM careers? Findings show that multiple factors encourage women in Kuwait to choose STEM disciplines, even though gender gap in workplaces persists. The results highlight entrenched barriers such as social stereotypes, gender biases within organizational hierarchies, and unsupportive workplace environments. These obstacles collectively hinder women’s career progression and restrict their access to leadership opportunities. By focusing on Arab women within the MENA region, this research provides culturally contextualized insights into gender participation in STEM and offers recommendations to foster greater support, advancement into leadership, guidance for policymakers and institutional leaders seeking to promote diversity, equity, and inclusion in scientific and technical domains.

**Keywords:** STEM, Gender Gap, Cultural biases, Occupational segregation, Professional positions

## 1. Introduction

In recent decades, global advancements in Science, Technology, Engineering, Mathematics, and Medicine (STEM) have transformed every sector in society (Badmus & Omosewo, 2020). However, despite this progress, a persistent gender gap remains, with women significantly underrepresented across STEM fields (Sassler et al., 2017). The disparity is evident not only in Western countries but also worldwide, including the Middle East and Gulf regions, where expectations for women’s roles can be more restrictive (Murray & Zhang, 2018). Women in STEM navigate the tension between gendered expectations and cultural identities, asserting their subjectivity against norms that valorise "masculine" traits, while their own "feminine" and Arab cultural values may be marginalized (Venn 2020). Women in STEM face significant challenges progressing into senior roles, as evidenced by a global “glass ceiling” (Strom & Burvall, 2018). This metaphor refers to the different barriers that usually prevent women from accessing top positions. In the Middle East and North Africa (MENA) region, women frequently occupy lower-level positions without proportional representation in decision-making roles (UNESCO Institute for Statistics, 2018). In Kuwait, where social, cultural, and institutional factors heavily shape women’s experiences and aspirations, women in STEM careers remain largely underexplored. This research aims to address this gap by examining the experiences of women and students in Kuwait’s STEM sectors, aiming to illuminate how gender influences career choices and participation in STEM

workplaces, and by focusing on their experiences, it advances our understanding of the factors that shape gender participation in STEM in Kuwait. This study addresses that gap through the following research questions: **1)** What factors motivate women to pursue STEM majors? **2)** What underlying causes contribute to gender gap in STEM workforce? **3)** What barriers and challenges do women encounter in STEM careers? Moreover, how do these challenges affect their advancement to higher professional ranks?

## **2. Literature Review**

### ***2.1. Women in STEM Workplaces Globally***

Gender segregation is currently portrayed as a ‘global crisis’ that primarily impacts women (Miranda, 2020). Major global tech companies report only 30% of their workforce as women. According to the American Association of University Women (2010), cultural beliefs and stereotypes lead women to believe they have a fixed amount of intelligence. A World Bank (Hammond et al., 2020) survey also reported that biases and stereotypes emerge at home, as parents often prefer their sons to work in STEM rather than their daughters. While international studies highlighted persistent gender gaps and workplace challenges in STEM, it is unclear how these factors manifest in Kuwait, where women’s experiences in STEM remain underexplored.

### ***2.2. Women in STEM Workplaces in the Gulf Cooperation Council (GCC):***

The issue of gender gap in STEM workplaces is evident not only in Western countries but also worldwide (Statista, 2019). According to the UNESCO Institute for Statistics (2018), women in five Arab countries are represented in administrative roles, with low participation in decision-making positions: Jordan (38%), Kuwait (43%), Oman (37%), Qatar (34%), and the UAE (35%). Islam (2019) noted a lack of women role models in STEM, and a survey commissioned by Emirates Global Aluminum company in 2017 found that, while UAE women are interested in STEM, more role models are needed to attract them to the industry. Although research in GCC countries identified cultural and institutional barriers affecting women’s participation in STEM, little is known about whether similar challenges affect Kuwaiti women specifically.

### ***2.3. Women in STEM workplaces in Kuwait:***

According to the Civil Service Commission’s latest statistics in Kuwait (2020), gender diversity in Kuwait’s STEM public sector remains limited. In engineering areas, women represent only 27% compared to 72% of men. In the private sectors, women’s labour force participation is just 31%. (Ajwad et al., 2022). While these statistics demonstrated persistent gender disparities in Kuwait’s STEM sectors, they do not capture women’s lived experiences or barriers shaping their career paths. Unlike global and GCC contexts, women’s experiences in Kuwait’s STEM workplaces remain underexplored, highlighting the need for further research on gender, culture, and professional opportunities in Kuwait’s STEM fields.

### ***2.4. Root Causes & Key Challenges***

The existing literature identifies several factors shaping women’s participation in STEM. Petersen and Madsen (2023) argued that societal pressures and gender norms influence women’s well-being and career decisions, while Islam (2019) noted that the lack of supportive policies discourages women from remaining in STEM. Research also highlighted a prevailing “male ethos in STEM professions,” making women feel they do not belong (Otero, 2018; Swamy & Smith, 2016). International reports indicated that such barriers may lead women to retire early (Hammond et al., 2020). However, it remains unclear how these root causes manifest in Kuwait’s STEM workplaces.

This study seeks to explore whether similar or different barriers shape women's experiences in Kuwait.

### 3. Data & Methodology

This study employed an active mixed approach (qualitative and quantitative instrumental approaches). The instruments were approved through the IRB ethical review evaluation committee under code KU-CLS-20-05-17. Qualitative data were obtained through conducting interviews with 20 Kuwaiti women employees at STEM sectors in Kuwait, while quantitative data were obtained through an online questionnaire answered by 300 undergrad and grad STEM students in Kuwait (Creswell, 2018). Participants were recruited using purposive sampling described by Sharma (2017) as a judgmental, selective or subjective technique, and a snowball sampling to reach hard-to-locate participants (Etikan, Alkassim, Abubakar, 2016). STEM employees were contacted through institutions' websites, while STEM students were reached through the scientific departments of the universities.

#### 3.1. Demographic & Consent Forms

To help situate participants within their broader social and cultural contexts, two forms were used prior to conducting interviews and distributing questionnaires. The first was a demographic form to collect basic personal information about participants. The second form was a consent form to confirm participants' willingness to be part of the study.

### 4. Qualitative Data: Interviews Data Collection, Analysis, and Results

#### 4.1. Instruments used for Interviews targeting STEM women employees:

The interview was chosen as an instrument to collect qualitative data and was conducted online through an app called "Zoom". The questions followed a semi-structured approach (Weller et al., 2018). Table 1 presents some of the interview questions.

Table 1. Interview Questions

<b>Factors that motivate women to choose STEM:</b>	<ul style="list-style-type: none"> <li>What inspired you to choose STEM as a career path?</li> </ul>
<b>Causes contribute to gender gap in STEM workforce</b>	<ul style="list-style-type: none"> <li>In your opinion, what might be the reasons that cause a gap between men and women in STEM workplaces?</li> </ul>
<b>Challenges &amp; Barriers women encounter in STEM:</b>	<ul style="list-style-type: none"> <li>As a woman leader, do you have complete freedom to act as a decision maker in your current role?</li> </ul>
<b>Recommendations on the practice for women to rise in STEM:</b>	<ul style="list-style-type: none"> <li>In your opinion, what type of support do women workers need as a motivational resource in STEM fields?</li> </ul>

#### 4.2. Procedures followed for Interviews targeting STEM employees:

After informing the participants about the study's goals and gaining their approvals, they were asked to do the following: **1)** Sign the consent form digitally and re-send the signed consent copy back. **2)** Access the provided questionnaire link to answer the demographic questions prior to the interview.

#### 4.3. Data Analysis Process:

Data were analysed using the "Grounded theory" method, which is suitable when little is known about a phenomenon (Chun Tie, 2019). The semi-structured interviews were transcribed from audio recordings into an Excel file, followed by line-by-line coding (See Figure 1), which helps to understand the participants' viewpoints (Charmaz & Thornberg, 2020). Each participant was

assigned a coded ID and title (e.g., TP = Professor in Technology) (See Table 2). The generated themes described some research questions (See Table 3), then verified by a second researcher, after that, their frequency was recorded, and at the final stage, a general discussion of the results was presented.

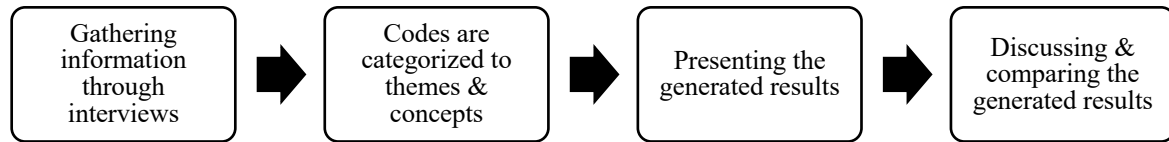


Figure 1. Inductive Logic of Qualitative Data Analysis Procedure

Table 2. Codes & Titles Assigned to the Interviewees Participants

Area of work	Position Title	Code / ID
<b>S</b> = Science	<b>E</b> = Employee	<b>SE</b> = Employee in Science
<b>T</b> = Technology	<b>P</b> = Professor	<b>TP</b> = Professor in Technology
<b>E</b> = Engineering	<b>R</b> = Researcher	<b>EP</b> = Engineering Professor
<b>M</b> = Mathematics	<b>D</b> = Dentist	<b>MP</b> = Mathematics Professor
<b>MS</b> = Medical Science	<b>PH</b> = Pharmacist	<b>MD</b> = Dentist

Table 3. Brief Analysis of the Interviews Codes & Themes

Concept	Concept	Concept	Concept
Factors that lead women to choose STEM	Challenges & barriers women encounter in STEM workplaces	Reasons causing gender gap in STEM areas	Recommendations on how to rise in STEM areas
<b>Main Theme</b>	<b>Main Theme</b>	<b>Main Theme</b>	<b>Main Theme</b>
Personal interest in the area of STEM	Un-supportive working environment	Strict mindset of the family or partner	Create a network and acquire leadership skills
<b>Frequency</b>	<b>Frequency</b>	<b>Frequency</b>	<b>Frequency</b>
18	20	17	16
<b>Code/ ID</b>	<b>Code / ID</b>	<b>Code / ID</b>	<b>Code / ID</b>
EP2	TE2	EP2	TE3

#### 4.4. Results of Qualitative Data Analysis

##### 4.4.1. Main Factors Motivate Women to Pursue STEM

One key factor was personal interest in STEM; a participant who is a mathematician (ME1) said: “Since I was in school, I was always interested in the Scientific domain, my grades were really high in scientific areas more than arts and humanities.” Another factor was the surrounding environment, as a participant who is an engineering professor (EP2) indicated: “My parents were both engineers, so they highly motivated me, and I remember I used to have a doctor in the university, and he really motivated to choose engineering.” The dynamics of socio-economic change in Kuwait also shaped decisions, as a participant who is a technologist (TP1) stated: “I don't think that the cultural issues are as bad now as they used to be, the society is accepting that women are changing, and even Kuwait started to offer more services to support working mothers due to its strong economy.” Some participants emphasized that STEM fields are gender irrelevant; a pharmacist (MSPH) mentioned: “I don't think that the presence in any STEM related field has anything to do with or a gendered difference, as both genders share the same skills.” The profitability of STEM also motivated

women, as a participant who is a professor in science (SP1) said: “STEM is more profitable financially, and it’s more expected in society.”

#### *4.4.2. Causes Contribute to Gender Gap in STEM Workplaces*

One main reason for the gender gap was social norms and stereotypes, as a participant who is a professor in the medical field (MSP1) said: “The problem in Kuwait is about the cultural misconception of what’s right and what is not right to women.” Family and partner strict mentalities also played a role, with an engineer participant (EE3) stating: “If the husband or the family are close-minded, this has a negative effect on allowing women to enter STEM areas.” Prioritizing marriage over career further constrained women, as another medical participant (MSP1) explained: “Because of our culture I see a lot of medical students or even employees who give up as they have a family and kids.” Gender biases in hiring of STEM institutions’ hierarchy were highlighted by a participant who is a mathematician professor (MP): “STEM companies don’t focus on qualifications, as gender is always considered as a criterion, plus the power of the biased social connections and nepotism in Kuwait plays a huge role.” The lack of STEM PhD programs was another factor, a science employee participant (SE1) noted: “PhD programs aren’t available in my country and since I’m a woman, I could not travel abroad”. Participants also pointed to the lack of women role models, with an engineering professor (EP2) reflecting: “When I think about STEM women role models, very little influencers will come up to my mind.”

#### *4.4.3. Challenges & Barriers Women Encounter in STEM Workplaces*

A primary challenge was the difficulty in reaching leadership positions, as a dentist participant (MSD1) said: “Males usually reach these leadership positions easily as they get nominated and even if women reach these high positions, they aren’t allowed to act as decision makers.” Another challenge was the unsupportive working environment, with a medical professor participant (MSP) commenting: “In STEM environments, women who face harassment and they don’t report it because there aren’t supportive policies.” Also, Women are also treated in biased ways compared to their male counterparts, as a pharmacist participant (PH3) explained: “Some of my male co-workers and patients don’t even look at my face, when I ask them a question, they direct the answer to my male manager instead.”

#### *4.4.4. Examples and Recommendations on Practices that women should follow to Rise in STEM*

Participants shared recommendations for women to advance in STEM. One key point was the importance of being themselves, as an engineering professor participant (EP1) explained: “Women should always support their ideas with documents and they will see how people will get attracted to it.” Another recommendation was to create a strong network and develop leadership skills, as a mathematician participant (ME) suggested: “Women should surround themselves with people who get them up and practice public speaking, as that would help to change the mindset positively.”

### **5. Quantitative Data: Questionnaire Data Collection, Analysis, and Results**

#### ***5.1. Instruments used for Questionnaire targeting STEM Students***

An online questionnaire was created using “Google Docs” and distributed to undergrad and grad STEM students.

#### ***5.2. Procedures followed for Questionnaire targeting STEM Students***

Students were reached via an email that contained the study information and questionnaire link, as well as through contacts and snowball sampling approach (Etikan, Alkassim, Abubakar, 2016).

### 5.3. Data Analysis Process

Quantitative data was analysed by presenting percentages in tables, graphics and charts with explanation. Percentages were calculated by dividing the number of responses by the total responses and multiplying them by 100. Results were then compared with the interview results and literature.

### 5.4. Results of Quantitative Data

This section highlights the main factors leading university students to choose STEM majors. When asked how they got enrolled in STEM, most participants (83%) indicated it was due to personal choices and preferences (See Figure 2). These results reinforced the interview findings, where students emphasized personal preference for scientific subjects as a factor in choosing STEM.

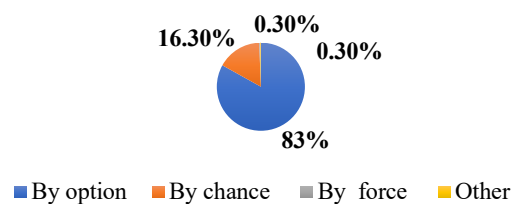


Figure 2. Percentages of Respondents on How they Got Enrolled in STEM

Questionnaire takers were also asked about the main factor influencing their decision to choose STEM. The majority (73.6%) indicated that their personal interest in STEM fields was the main factor (See Figure 3). These results confirm that intrinsic interest is the dominant motivator, aligning with the interview findings.

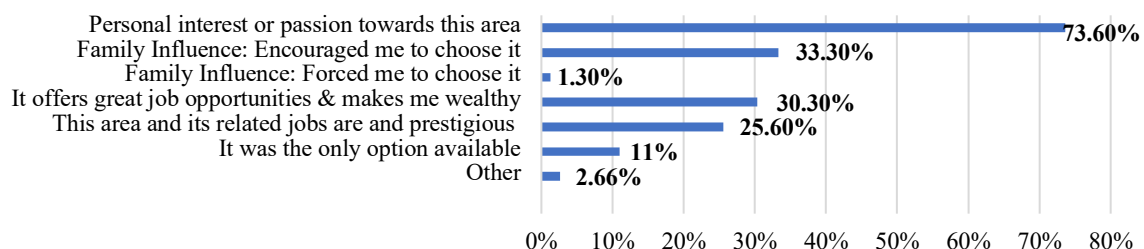


Figure 3. Percentages of Respondents Regarding the Factors Behind Choosing STEM

Questionnaire takers were also asked whether biological-gender differences impact their performance in STEM. Most respondents rejected this notion, with 36% strongly disagreeing and 41% disagreeing (See Figure 4). These findings aligned with the qualitative responses, where participants emphasized that STEM is gender irrelevant and biological differences don't influence their choices.

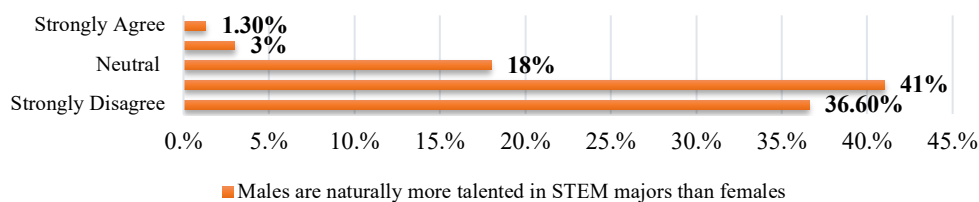


Figure 4. Percentages of Respondents Regarding their Perspectives on Biological Differences between Genders

Questionnaire takers were asked to choose either “Yes” or “No” if social stereotypes and norms had a negative effect on their choices for STEM. 79.7% mentioned that their culture had not negatively affected their choices (See Figure 5).

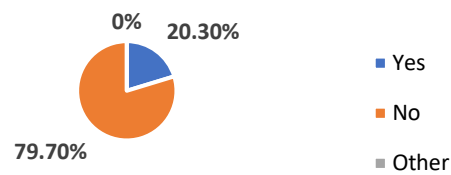


Figure 5. Percentages of Respondents Regarding their Perspectives About the Negative Effect of Social Stereotypes & Norms

Questionnaire takers were asked about the gender of role models influencing their study or work. Results showed that 41.7% indicated having no role models. On the other side, 33.3% were influenced by male role models, and only 25% by women’s role models (See Figure 6).

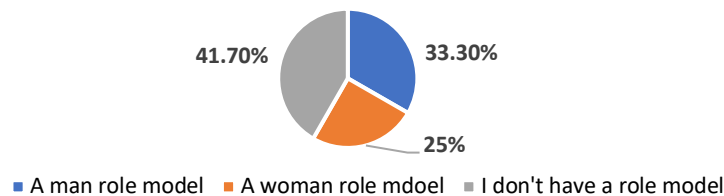


Figure 6. Percentages of Respondents Regarding the Gender of Their Role Models

Questionnaire takers were asked about the steps to increase women in STEM workplaces. The results showed that 57.3% agreed on creating a healthy STEM working environment, and 52.3% indicated that introducing more mentor-ship programs about diversity in schools and workplaces can increase women’s participation (See Figure 7).

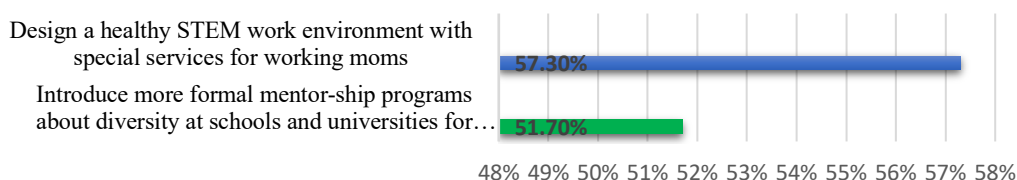


Figure 7. Percentages of Respondents Regarding their Perspectives on how to increase Women's Involvement in STEM

## 6. Discussion

The findings are discussed below in relation to the research questions and prior literature.

### Discussion of RQ1: The main factors that motivate women to pursue STEM

**Personal interest in the area of STEM:** Most STEM employee participants indicated that personal interest is a key factor in choosing STEM. Similarly, most of the STEM student participants mentioned the same. This aligns with Purohit et al. (2021), who indicated that women’s career choices are shaped by their personal interests alongside cultural, social, and structural factors.

**Getting inspired and supported by the surrounding environment:** Many STEM employee participants noted that encouragement from family and the environment influenced their decision

to enter STEM. The same point was emphasized by a high number of STEM student participants who mentioned parental influence as a factor. This aligns with Tegelbeckers et al. (2019), who highlighted parental home as a significant influence. These factors are interlinked, as personal interest motivates STEM entry, while encouragement reinforces that choice, but these positive factors operate within a broader context of challenges addressed below in RQ2.

### **Discussion of RQ2: The causes that contribute to gap in STEM careers:**

***Negative impact of social norms, culture, traditions, and stereotypes:*** Most STEM employee participants highlighted that societal traditions and stereotypes in Kuwait are the reasons for lack of women in STEM. Some STEM student participants who were employees also noted that social stereotypes contribute to gender gap. A study by Otero (2018) supported this by stating that societal biases help to create the gender gap in STEM.

***Lack of women role models in STEM areas:*** The vast majority of STEM employee participants expressed that the lack of women role models is a reason behind the gender gap. Most STEM student participants also reported not having accessible role models. Herrmann et al. (2016) emphasized the importance of women mentors in inspiring students. These reasons are interlinked, as restrictive social norms limit the visibility of women, reinforcing those norms. Such interconnections suggest that interventions must be multifaceted.

***Gender biases & lack of diversity in STEM institutions' hierarchy:*** STEM employee participants reported that biased hiring practices are impacted by social-political connections (nepotism). Botella et al. (2019) showed that female students enrolled in STEM have been decreasing over the last 20 years due to the biases in the hiring systems, and female attrition from tech jobs remains high.

***STEM careers and PhD programs are limited, tough, and male-dominated:*** STEM employee participants suggested that the limited number of local STEM PhD programs requires to travel abroad, which many Arab families restrict due to marriage and family expectations. This reason aligns with Adamowicz (2017), who described how social challenges reflect intersecting gendered biases that disproportionately affect women in STEM settings. These two reasons are connected to each other as the male-dominated structures within STEM perpetuate the lack of academic opportunities, such as PhDs, for women. Such patterns suggest that solutions need to address both institutional and social constraints. In summary, limited women role models, stereotypes, and lack of diversity contribute to the gender gap in STEM. RQ3 below builds on this by exploring the challenges women encounter in STEM in Kuwait and strategies they use to advance.

### **Discussion of RQ3: Challenges & Barriers Women Encounter in STEM Workplaces**

***Difficulty in reaching top-leadership positions:*** STEM employee participants noted that women face barriers in reaching high positions. This idea resonates with Kong et al. (2020), who reported low women's participation in STEM top positions.

***Having an unsupportive working environment:*** Most STEM employee participants highlighted that STEM workplaces provide limited support for women and working moms. STEM student participants who were employees shared similar observations, noting that STEM environments are not women-friendly and talents are unappreciated. A healthy working environment is critical for women's careers (Purohit et al., 2021). These challenges are interlinked, as unsupportive workplaces limit opportunities for leadership. Addressing both is essential to reducing gender gap. In summary, difficulty in reaching leadership positions and unsupportive work environments are major challenges for women in STEM, operating alongside the social barriers discussed in RQ2. The next section (RQ3's follow-up) explores how women can navigate these challenges.



### **Discussion of RQ3: How do women contribute to rise in their professional ranks**

STEM employee participants emphasized that confidence and ambition help women advance in their workplaces. STEM student participants recommended formal mentorship programs about diversity in schools and workplaces that aim to support women in STEM. Islam (2019) similarly highlighted that effective approaches are needed to help women thrive. These strategies are interconnected, as women's ambition is most effective when supported by mentorship and policies. Overall, the qualitative and quantitative findings complement each other. Qualitative insights, such as personal interest and family support, align with quantitative data on gender gaps in PhD participation and leadership roles. Social norms and unsupportive workplaces further reinforce quantitative patterns of gender bias and lack of diversity. Together, these findings indicate that both personal strategies and systemic changes are necessary to reduce gender gap in STEM in Kuwait.

### **7. Implications for Policy and Practice**

These findings imply that policymakers should focus on addressing hiring biases, and fostering inclusive environments to support women's involvement in STEM. Implementing such measures can help to reduce gender gap and enhance STEM diversity in Kuwait and the MENA region.

### **8. Limitations and Future Work**

As an exploratory study, these findings are specific to the Kuwaiti context, women's experiences in other MENA countries may differ. Future research could compare multiple countries or examine long-term career trajectories of women in STEM.

### **9. Conclusion**

This research explored STEM from the perspectives of Arab women in Kuwait, examining how gender is shaped by the cultural and social factors towards their career choices. Although Kuwait has a relatively high percentage of women enrolled in STEM compared to other GCC states, significant factors, reasons, and challenges continue to influence their participation. Analysis of women's experiences in Kuwait's STEM workforce highlighted personal interest, as the most important factor in pursuing STEM careers. The study also identified key obstacles, particularly biases in hiring and institutional hierarchies, which limit women's advancement to top leadership positions. These findings provide evidence-based insights for academia and industry to better support women's careers. As the gender gap in STEM persists in Kuwait, the GCC, and the broader Arab region, new strategies are needed to promote intersectional approaches toward social justice and workplace diversity.

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